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JAN MAYEN EXPEDITION OF 1911

BY

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The Jan Mayen Expedition of 1911 was organized by J. Foster Stackhouse, F.R.G.S., F.R.S.S. The party under his command consisted of Mrs. Stackhouse and seventeen men. The destination was Jan Mayen; the object, to make a series of meteorological observations between Iceland and Jan Mayen and to survey the coast of the island for data to supplement the work of the Austrian Expedition of 1882-3. Mr. Stackhouse had had in preparation for some time the construction of a relief map of Jan Mayen and he desired to make a personal observation of the coast lines and take some measurements.

The expedition contained a meteorologist, a zoologist, two ornithologists, a geologist, two color photographers, a botanist, a mountain climber, a cartographer, a cinematograph operator and an artist. A suitable vessel had been chartered, but a short time before the party assembled at Newcastle, England, the charter had to be cancelled through a whim of the owner. We were obliged to take what we could find at short notice,—the *Matador*, 232 tons gross register. She was a private steam yacht, a first-class sea boat, but of insufficient bunker capacity for our purpose. The charter gave a coal capacity of 40 tons. By coaling on the east coast of Iceland and carrying a load on deck, we hoped to reach the island and have a few days for work on the coast survey, providing the waters were free from ice.

We sailed from Newcastle at 6 A.M., July 30. The course was laid through the Orkney Islands, and the Faroes to Seydisfjord, Ice-

land, that we might easily reach a coaling station in case of stress of weather, which would prematurely deplete our coal supply. We had on board the Icelandic mail and carried an expedition flag, modelled after that of the Arctic Club of America, with the British Jack in place of the Stars and Stripes. We left the mail at Seydisfjord on Aug. 3, and coaled. We here made the distressing discovery that in place of forty tons, as stated in the charter, our bunkers held only twenty-four tons.

A violent storm on the east coast of Iceland detained us in port two days. During this time the botanist, the ornithologist and the

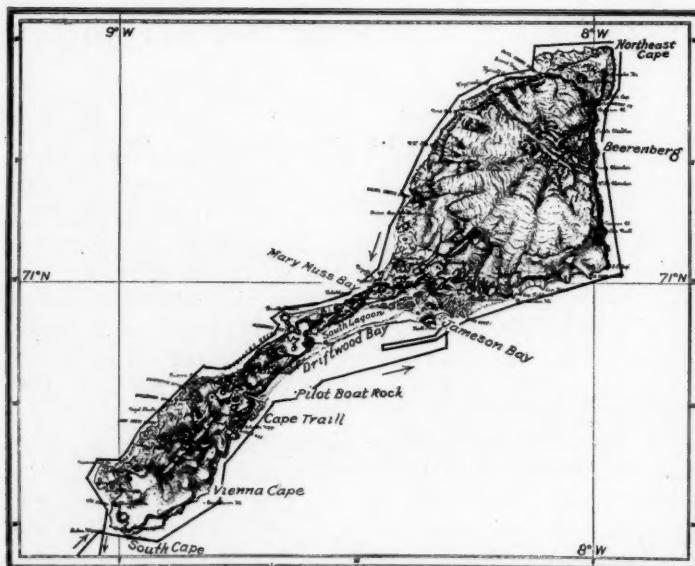


FIG. 1—Map of Jan Mayen based on the map of the Austrian Expedition of 1882-83.
1:500,000 (1 in. = 7.89 miles). The full line accompanied by arrows
indicates the course of the *Matador*, August 11-12, 1911.

geologist explored the valley at the end of the fiord and the mountains on either side. A large amount of good material was collected for the museums represented by the expedition. Among the minerals was an excellent meteorite, which, as far as we knew, was the first one ever reported from Iceland. It is now in the private collection of Baron Axel Klinckowström in Stockholm.

Early on Aug. 5, we put to sea with the storm still raging. During the afternoon the wind continually increased and the sea became so

heavy that we sought the shelter of Langanes, the northeast point of Iceland. Here we were held for 36 hours in the open bay of Eidisvik. During this period the scientists continued their collections and fully explored the peninsula. The most noticeable feature is the driftwood. There were many logs of great size, some of which bore the marks of the ax, but most of them had been torn up by the roots in spring freshets and swept out to sea. They are of the same character as those I afterwards examined in Driftwood Bay, Jan Mayen. This material evidently came from the great Siberian rivers. Carried out to sea with the spring floods, they became embedded in the ice and slowly drifted with the pack ice as did the *Fram* with Dr. Nansen and the Melville-Bryant Cask No. 6, deposited on the ice

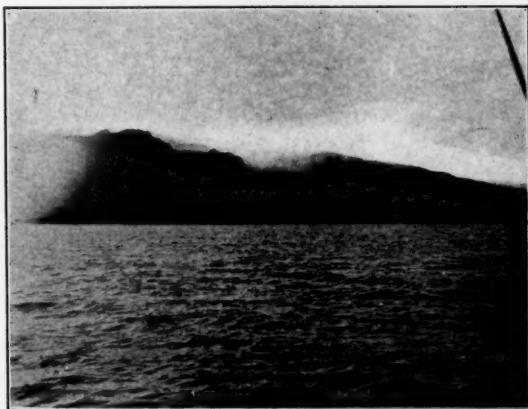


FIG. 2—Entrance to Driftwood Bay. Heavy fog hanging over Beerenberg.

off Point Barrow, Sept. 13, 1899 and picked up by an Icelander at Cape Raudagnupr, northwest of Eidisvik, on June, 1905. All this material must have drifted to the north of Franz Josef Land and Spitzbergen. It then met the more open ice stream that comes down east of Greenland and drifted southward, some of it landing on Jan Mayen and some of it in this bleak bay. The water-worn and ice-scarred timber provides sufficient material for the Icelanders of the north to construct their houses and furnishes an abundant amount of fuel. Much of it is transported into the interior, still more is left upon the shore to decay or again be washed out to sea to find lodgment in the Faroe Islands.

The state of the weather, the condition of the sea and the short-

ened supply of coal seemed to forbid our further progress. We held a consultation, and it was voted to return to one of the eastern fiords, recoal and then, if the sea did not improve, to set south to the Westmann Islands and devote a week to cartographical and geological work. While the coast line of Iceland has been carefully surveyed by the Danes, the Westmann Islands have been neglected and there is opportunity for scientific work there.

A little after midnight on Aug. 8, we entered Faskrudsfjord. We were unable to coal at once as the *Ask* was tied up to the only jetty. The day was, however, profitably spent. Among geologists, Iceland is famed for zeolites. I have collected many fine specimens in the

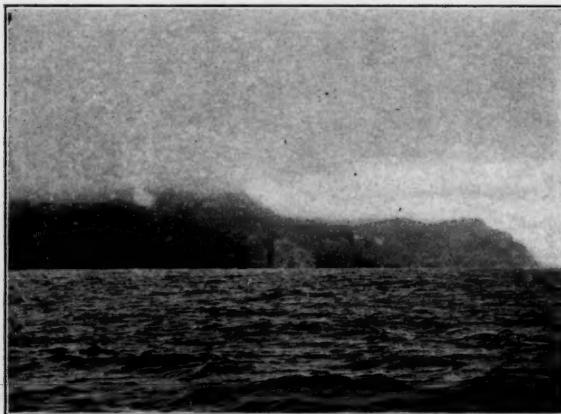


FIG. 3.—General character of the Jan Mayen coast, rising straight up from the sea. Pilot Boat Rock, the dark pinnacle of rock rising from the sea in the middle of the picture.

interior during a trip of over 1,000 miles, but I have never seen such excellent specimens as I, dug out of the bed of a brook which flows down a ravine here, formed by a fault in the lava. We also obtained another specimen very rare in Iceland, of fossilized wood of the Tertiary Period. The specimen was filled with minute zeolites.

We learned by telephone that weather conditions north of Iceland were a little more favorable. With our bunkers full and a good deck load we decided to make one more attempt to reach Jan Mayen. We crossed the Arctic Circle, blew the whistle, and cast overboard a record in a sealed bottle. Hourly observations of air and sea temperatures, the reading of the barometer, direction and velocity of

the wind, compass course and log dial were taken. The velocity of the wind increased and the *Matador* was tossed about so much that we spread all the sail possible to steady the ship. The water temperature steadily decreased but no ice was in sight. Our Icelandic friends warned us that there was much ice in the north waters.

At midday, Aug. 11, a bank of fog loomed in the north. In it somewhere we knew must lie Jan Mayen. A little later we got a glimpse of South Cape and changed our course to bring us just east of the land. Bird life was very abundant and the birds being unacquainted with man flew fearlessly about us and through the rigging. We did not, however, like the French expedition of 1892, "have to push them out of the way to make progress."

When we reached Vienna Cape, the fog lifted so as to give us a view of the summits of the southern craters. The sun shone brightly on Driftwood Bay just ahead and we hoped for a view of Beerenberg. Slowly we steamed close to the shore. A series of photographs was taken to form a full panorama and many sketches and bearings were taken. Everyone was busy.

Reaching Jameson Bay we tried to land but found it impossible on account of the heavy breakers. Turning back to Driftwood Bay we anchored opposite the South Lagoon. It seemed impossible to make a safe landing but Stackhouse, Beetham, Swan and the writer volunteered to make the attempt. We pulled the gig to the edge of the breakers. The sea was running so high that when we were in the trough of the sea we were invisible from the deck of the *Matador*. Slowly we worked southward, past Pilot-Boat Rock to the cliffs near Cape Traill but with no success. This was also the experience of *La Manche* party in 1892. Longingly we examined the heaps of driftwood and thought of the big bonfire we were to make to dry out the fog and spray and efface the chill of the past three days. The ragged lava ridges patched with snow, the gullied mounds of ashes spotted with pale green moss, the abundance of fearless birds flitting between us and the shore, the water courses rushing down from the melting snows, the beautiful sunlight on the beach, the quiet, lonesome beauty of the stately cliffs, the impenetrable fog shrouding the upper peaks, these were the elements of charm on a dreary, lonesome coast, that lured us across the breakers. But prudence forbade. After a long pull we regained the *Matador*. During our absence the guns had been busy and a large number of birds were strewn over the deck awaiting the knives of the taxidermists.

It was 9 P.M. For hours we had cast wistful eyes towards Beerenberg, the most northern volcano in the world, rising 8,000 feet above

the sea. Beerenberg is a rare, a magnificent spectacle. For a few moments the fog opened near the summit, though the middle portion of its glacier-covered slopes was hidden. The sun shone resplendent on the mighty dome of ice, suspended like a truncated cone, apparently in mid air. Then the curtains were swiftly drawn and we were not again to see the wonders of that view from the east. At the same time the fog lifted from the lower and mid-slopes and we saw only the mighty glaciers reaching down from the mist into the pounding surf.

At midnight we rounded Northeast Cape with the sun shining brightly and obtained a momentary view of the summit towards the south but nothing, not even the grandeur of this view, can equal the



FIG. 4—Cape Traill.

splendor of that eastern vision. Slowly we proceeded around the entire coast, hoping to effect a landing at Mary Muss Bay, the home of the Austrian Expedition. The heavy sea prevented. The Austrian station buildings, partly covered with sand, loomed in the mist. We planned to wait a few days here for the sea to subside that we might land some supplies we had taken to leave in the station and report upon the condition of those left by the Austrians twenty-eight years ago. We made a careful estimate of our coal and were dismayed to find that we had a scant supply to reach the Iceland coast. We decided to start at once. The wisdom of this decision was shown some days later when we steamed into Seydisfjord with only enough coal left to steam two hours. For some time before our departure

we blew our whistle continuously on the chance that there might be some shipwrecked fishermen waiting for a friendly ship to take them back to inhabited lands.

We saw no sea ice of any description around Jan Mayen. The waters were entirely free. Nor was there any ice blink to indicate the presence of ice beyond the horizon. I am unable to find any record of such free water about Jan Mayen as we experienced. Some expeditions have failed to get nearer than thirty miles of the land on account of the ice barrier.

The island is entirely volcanic and of the same formation as the Reykjanes Peninsula in Iceland. If there is any subterranean connection between the two islands it is very deep seated, for the sea is 1,000 fathoms deep a little to the south of Jan Mayen. A remark-



FIG. 5—Sunlight through the rifted fog lying low off the east of Iceland.

able thing about the formation of the island, which is about thirty miles long, is the great depth of water but a little way from the shore. Its volcano comes straight up from this great deep and the fifteen miles of lava ridge south of it is but the overflow of lava, reaching southward like the bone in a lamb chop. The mountain is entirely covered with glaciers, which are fed by the continually falling snows, the condensation of the heavy fogs that perpetually envelop its cold and lofty summit.

Botanically, ornithologically and geologically we thoroughly explored three of the fiords of the east coast of Iceland. One of them, Brimnesfjord, is little known, an elevated, glacial valley. We secured many museum specimens.

We established the fact that ice-free waters do sometimes exist

entirely around Jan Mayen, the charts and the records to the contrary.

We secured a valuable collection of photographs and sketches of the entire east coast and made cinematograph pictures of the shore and the glaciers as we steamed along.

We made a complete meteorological record across the ocean from Langanes to Jan Mayen and return. Taken in connection with the work done by *La Manche* these data are useful. Says the commander of that expedition: "A series of observations is important, but it is only one point of the changing series of seasons, and science has great interest in reviewing the work done ten years ago." Our records were taken nineteen years after those of *La Manche* so that we now have three "points" with enough time between to make them scientifically valuable for comparison, being taken over the same stretch of sea at the same time of the year. A table is given below for comparison of the last two "points."

We failed to land, but the mere act of landing without time to do systematic work would have been useless. We might have taken some of the twenty tons of coal left by the Austrians but this would have been a crime. This coal is for the relief of shipwrecked mariners or for any party wishing to winter.

READINGS OF BAROMETER, TEMPERATURE OF THE AIR AND OF THE SEA FROM
LANGANES, NORTHEAST COAST OF ICELAND, TO JAN MAYEN.
STEAM VACHT *Matador*, AUGUST 10-12, 1911.

DATE.	HOUR.	POSITION—		BAROMETER.	TEMPERATURE—	
		LAT.	LONG.		AIR.	SEA.
August 10	5 A.M.	66° 30' N.	14° 30' W.	762.0 mm	5.8° C.	6.3° C.
	7 A.M.			761.49	6.0°	7.2°
	12 M.	67° 15'	13° 15'	761.5	5.5°	6.4°
	2 P.M.			762.0	6.0°	7.5°
	9 P.M.			762.25	4.3°	7.2°
August 11	12 A.M.	68° 45'	11° 30'	763.01	5.3°	6.5°
	7 A.M.			763.27	5.2°	6.5°
	12 M.	69° 10'	9° 45'	765.82	5.0°	6.1°
	2 P.M.	off South Cape		765.82	5.0°	5.5°
	6 P.M.	{ 70° 57'	8° 30' }	765.82	6.0°	3.5°
	9 P.M.	Driftwood Bay		766.57	5.0°	4.3°
August 12	12 A.M.	{ 71° 12'	7° 57' }	765.82	6.0°	3.5°
		Northeast Cape				
	3 A.M.	{ 71° 0'	8° 30' }	766.06	5.4°	5.0°
	6 A.M.	{ 70° 50'	9° 3' }	766.06	6.2°	6.0°
	7 A.M.			766.06	6.5°	6.0°
	2 P.M.			767.08	8.0°	7.2°
	9 P.M.			767.08	7.7°	7.0°

NOTES.

A comparison of the barometer readings of 1882-3, 1892 and 1911 for the corresponding season of the year yields interesting results.

Mean Barometer in August, 1882.....	754.87 mm.
" " " 1892.....	763.5
" " " 1911.....	766.92

The Isobar for this season and locality is charted by Davis as 756.92. Our mean barometer reading for two weeks off the east coast of Iceland was..... 756.66, which corresponds to the given Isobar.

Again, there seems to be a great ocean eddy between Langanes and Jan Mayen as shown by our sea temperatures, state of the sea and winds. The data cannot be given here for the deduction. The limits of this eddy are fifty miles north of Iceland and fifty miles south of Jan Mayen. The south flowing Arctic Stream along the east Greenland coast, and the northwest drift of waters off the west coast of Norway undoubtedly contribute to this condition.

HISTORICAL.

1607. HENRY HUDSON is usually credited with the discovery, having found the island on his return from Spitzbergen. It was long known as "Hudson's Touches."

1610. CORNELIUS DOETTS, a Dutchman, discovered the island, according to a chart printed at Amsterdam by Dirck Peters, which is now in the Museum of Bergen.

1611. JAN MAYEN, a Dutchman, discovered the island, according to one authority, and gave it his name. By this name it has been known since 1611.

1611-1690. Jan Mayen was a station for the Holland Whale Fishery. See *The Dutch in the Arctic Seas*, by S. R. Van Campen, for a full account.

1633-34. Seven Dutch sailors tried to winter on Jan Mayen. All died of scurvy.

1817. WILLIAM SCORESBY, Jr., roughly surveyed the island and wrote a brief account.

1856. LORD DUFFERIN, in the *Foam*, visited the island and landed for a few moments, after a hard fight with the ice. He did no scientific work.

1856. LA RONCIÈRE, a Frenchman, in the *Reine-Hortense*, closely following Dufferin, gave up the attempt when about 125 miles from the island on account of coal shortage.

1861. DR. BERNA, German, made a landing, but retreated on the sudden rising of the sea.

1869. KOLDEWAY, German, in the *Germania*, tried to land, but failed on account of the heavy sea.

1882-3. WOHLGEMUTH, in the *Pola*, established one of the thirteen International Circumpolar Stations in Mary Muss Bay on the 71st parallel. The party were chiefly engaged in meteorological work. They surveyed the island and constructed a fairly accurate chart. Our observations in 1911 show many inaccuracies.

1899. A. G. NATHORST, a Swede, on his expedition to the east coast of Greenland and Spitzbergen, stopped at Jan Mayen for a few hours.

1891. CHARLES RABOT, a Frenchman, in the *Châteaurenault*, starting from the French fishing station in Faskrudsfjord on the east coast of Iceland, was turned back by the ice barrier. He was accompanied by Auguste Gratzl, an Austrian, of the expedition of 1882-3. Their object was to examine the condition of the stores left there in 1883.*

1892. BIENAIMÉ RABOT, French, again accompanied by Gratzl, in the *Manche*, visited Jan Mayen, entered Mary Muss Bay, and effected a landing on the 27th of July. They stopped but a few hours.

1911. STACKHOUSE Expedition in the *Matador* reached the island on August 11th. It is the purpose of this party to return in 1912, complete the survey of the land, make ocean soundings and, if the ice permits, make the Liverpool coast of Greenland.

* Greely, Handbook of Arctic Exploration, in referring to this expedition, places Faskrudsfjord, a fiord in Iceland, in Jan Mayen.

HANGING VALLEYS OF THE YOSEMITE*

BY

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COMPARISON OF THE YOSEMITE WITH OTHER VALLEYS.

The Yosemite Valley has often been compared with other valleys in an attempt to throw light on the question of its origin. Such comparison, to be of value in the present discussion, must be made between similar valleys which are known to have developed under different conditions. It is clearly inadmissible, for example, to compare the Yosemite with other similar valleys which have also been occupied by glaciers; or with V-shaped gorges in non-glacial regions. For this reason the comparisons mentioned by Turner (318-319) all seem to me inappropriate. So far as can be learned from maps and descriptions, every one of the valleys mentioned by him was either certainly or probably occupied by ice; or has no typical hanging tributary valley; or is a V-shaped young gorge with narrow bottom. Similarly, the discussion of hanging valleys given by the same author on an earlier page (271) is unconvincing, inasmuch as the hanging valleys cited are very short, or have partially graded their lower courses; and all are tributary to a main stream which occupies a narrow-bottomed V gorge of pronounced gradient. They

* Concluded from p. 837, November *Bulletin*, 1911.

are in no sense comparable with the hanging valleys tributary to wide open valleys, such as the Yosemite, which appear to afford strong evidence in favor of glacial erosion.

Instead of disproving the glacial origin of the Yosemite, the comparison of valleys suggested by Turner really affords strong evidence in favor of the theory of glacial erosion. It is no mere coincidence that of the six valleys named by that writer the two most unlike the Yosemite have presumably suffered little or no glaciation, whereas the four most like the Yosemite served as the outlets of extensive glacial basins. The areas of these basins may be determined roughly by drawing boundaries which shall enclose all of the strongly glaciated region tributary to the several valleys. Although this does not take account of the passage of ice from one basin to another across the present divides, the method is sufficiently accurate, when applied to alpine regions of strong relief, to enable one to discriminate between profoundly and slightly glaciated basins, and between basins which favor extensive erosion of the master valley, and those which do not.

The valley near Sugar Loaf, on the South Fork of the American River, is so little like the Yosemite that the contour map leaves one in doubt as to why they should be compared; for the contours represent a V-shaped gorge without hanging valleys, although a few of the tributaries have their lower courses somewhat over-steepened. The basis of comparison with Sawmill Canyon is simply that the latter "under favorable circumstances would widen out into a Yosemite"; but since this questionable statement involves the very point at issue, the comparison is not permissible. On the other hand, the small valley on the Middle Fork of Stanislaus River at the mouth of Niagara Creek bears some resemblance to the Yosemite by reason of its steep walls and flat floor; but the contour map shows such marked evidences of glaciation in the headwater portions of streams draining into this valley that it seems quite probable that a glacier traversed the valley and gave to it its peculiar form. The area of the glacial basin is smaller in this case than in the others mentioned below, and this may account for the small size of the glacial trough on the Middle Stanislaus. Hetch Hetchy Valley is truly another Yosemite, larger than the valley on the Middle Stanislaus, because it is the outlet of a larger and more profoundly glaciated basin. It is smaller than the real Yosemite, because its glacial basin, while very large, is very asymmetrical (Fig. 3 a). The ice streams, instead of flowing comparatively short distances to the center of the basin and there uniting to form a large and powerful glacier, as in

the case of the Yosemite Valley (Fig. 3 b), were compelled to flow almost clear across the basin before reaching the master valley, which they joined at various points along its course, instead of concentrating at one point. It should be remembered, also, that part of the ice of the Hetch Hetchy basin crossed the divide into the

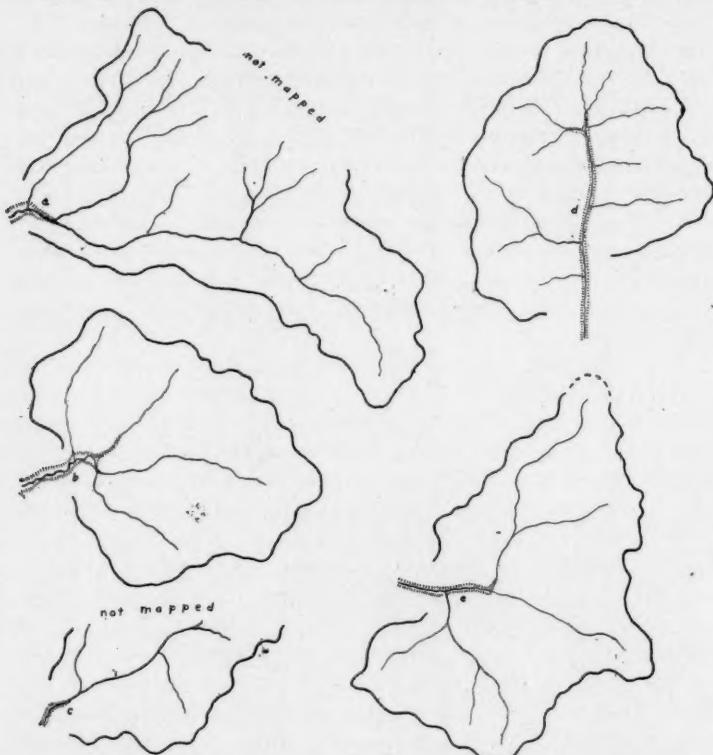


FIG. 3.—Sketch maps showing relation of the Yosemite and other similar valleys to their glacial drainage basins. Stream lines indicate general direction of glacial drainage. Based on U. S. Topographic sheets. No account is taken of ice entering basins from beyond present divides. a, Hetch Hetchy Valley; b, Yosemite Valley; c, Tehipite Valley; d, Kern Cañon; e, Grand Cañon of Kings River.

Yosemite basin; but I believe the shape of the area draining into the Hetch Hetchy is the more important factor in determining the less profound glaciation of that valley.

Tehipite Valley is likewise the outlet of a basin (Fig. 3 c) in which glaciation was evidently very pronounced. While the glacial

trough form is marked, this valley is less striking than the Yosemite, presumably because its glaciated basin is less symmetrical and permitted less concentration of the ice streams than was the case with its more fortunate neighbor. The Grand Canyon of Kings River, the last of the valleys mentioned by Turner, is the outlet of a splendid glacial basin (Fig. 3 e); consequently it is itself a splendid glacial trough. One might add to the above list Kern Canyon, which has the trough form well developed, because it is the outlet of a basin (Fig. 3 d) in which glaciation was profound, and is so shaped as to admit of a fair concentration of ice streams. Yosemite Valley owes its preëminence to the favorable combination of several elements: (1) a remarkably symmetrical basin, which was (2) profoundly glaciated, and which permitted (3) intense concentration of ice streams, one of which was augmented by (4) overflow ice from a neighboring basin. Variations in the country rock doubtless played their part in giving to the different troughs different degrees of perfection; but I regard rock differences as of less importance than differences in the size, shape, and extent of glaciation, of the basin for which the troughs serve as outlets.

Turner has suggested (p. 318) that the Yosemite Valley may have acquired a depth of 1,000 feet by the beginning of the Pleistocene, and that this "lessens the difficulty of accounting for the present depth of the Yosemite and of other canyons of the southern Sierra." The elevation of the Merced River previous to glacial overdeepening was, as shown above, from 2,000 to 2,500 feet above the present level of the stream, or between 6,000 and 6,500 above present sea level. This may have been 1,000 feet below the higher parts of the imperfectly developed peneplain. In any case, the present hanging valleys appear to have been graded with reference to that elevation of the Merced, and the indications are that the Merced at that time occupied an open valley as did the tributaries. The difficulty which confronts the theory of stream erosion of the Yosemite is not the absolute depth of the canyon, but rather the relation of the broad-floored main valley to the hanging valleys. This difficulty is not lessened by imagining an earlier or later date for the initiation of canyon cutting.

The character of Tenaya Canyon has always been a serious difficulty in interpreting the Yosemite as a stream carved valley. Tenaya Creek, with a drainage area little if any larger than that of Yosemite Creek, flows through a wide open valley to an accordant junction with the aggraded floor of the open Yosemite Valley, instead of dropping 2,000 feet or more from a hanging valley. Assuming nor-

mal stream erosion, it is hard to see why one small tributary should be able to reduce its valley to grade and to open out its valley floor to a considerable width, while a similar tributary near by has made but a small beginning on so vast a work. Mr. Theodore Solomons has suggested that the Lyell Fork of the Tuolumne and its branches were formerly headwaters of Tenaya Creek, but have been captured by the Tuolumne River. This would account for a formerly larger volume of Tenaya Creek, under which condition the cutting of the canyon would seem less remarkable. Turner (276-277) discusses this possibility, but on the evidence of river gravels dismisses it as "very improbable." Even if we suppose that the Lyell Fork drainage formerly came through Tenaya Canyon, we still encounter difficulties in explaining the relation of the canyon to the hanging valleys. On the other hand, if we accept the very reasonable hypothesis that during the glacial period much ice from the Tuolumne Valley crossed the low divide into the Tenaya Basin, and thus agree with Turner (305-306) and Gannett (87) that the Tenaya Glacier was the largest ice stream which entered the Yosemite Valley, we have, on the theory of glacial erosion, an adequate explanation for all the features observed. The Tenaya Canyon owes its U-shaped cross-profile, and its depth below the hanging valleys to glacial erosion. The canyon is deeper and more imposing than other valleys tributary to the Yosemite, because it was carved by the most powerful tributary glacier. The small Tenaya Creek is even much deeper than corresponding portions of the main Merced River in the Little Yosemite Valley, because the Tenaya Glacier was larger and more powerful than the Little Yosemite Glacier.

THE LONGITUDINAL PROFILE OF THE MERCED RIVER

Reference has been made above to the fact that some of the streams entering the Merced west of El Portal, as, for example, Bear Creek and the North Fork of the Merced, have over-steepened lower courses. They join the Merced with accordant junctions, but a short distance back from the main river show an increase in gradient, while their upper courses are again of gentle slope. One should not be surprised to find a comparable feature in the main river itself, farther up stream. For while an even tilting would initially increase the gradient of the main river uniformly throughout its course, greater volume would allow the lower course to intrench itself more rapidly. If to difference in volume we add difference in rock resistance, it is easy to see how one part of the stream flowing in weaker

rock might intrench itself more rapidly than a part up stream on more resistant rock, thus developing a locally steep gradient which would gradually retreat up stream. Something of this nature is shown in the longitudinal profile above (east of) El Portal. It should be remembered that, west of El Portal, the valley of the Merced is unglaciated, while east of the western end of the Yosemite, the valley has been profoundly glaciated. Between these two points, El Portal and the western end of the Yosemite, the valley has been traversed by glaciers to some extent, and shows the effects of glacial erosion very distinctly near the Yosemite, but to a decreasing extent toward El Portal. Had the pre-glacial Merced possessed a well-graded profile in this region, we should expect to find now, as a consequence of glacial erosion, a gradual decrease in gradient above El Portal, until the gradient finally became approximately flat, or even reversed, in the Yosemite Valley, where glaciation was most profound. Instead, we find a very pronounced steepening of the gradient above El Portal, similar to the steepening observed in the lower courses of the non-glaciated tributary streams farther west. It is evident that before glaciation the main river had not completely graded its course, although it had pushed the over-steepened zone as far up stream as El Portal. From this point the profile rose rapidly to a level some 2,000 feet above the main portion of the Yosemite Valley, as shown by the position of the hanging valleys. The western part of the Merced was then entrenched, the eastern part still flowing on the uplands. Glacial erosion has greatly altered the profile of the eastern part, but some trace of the pre-glacial conditions persists in the over-steepened profile east of El Portal.

VALLEY WIDENING IN JOINTED ROCKS

One of the most evident relations in the present topography of the Yosemite Valley is the control of joint planes upon weathering and erosion. Impressed by the remarkable form of the Yosemite Valley as a whole and by the important influence of jointing upon the form of the valley walls, some observers have genetically connected the two, seeking to explain the former by the latter. Unfortunately, no one who supports this view has set forth in detail just how stream erosion on jointed rocks can develop valleys essentially different from those developed by stream erosion on unjointed rocks. A brief analysis of this phase of the Yosemite problem may not be amiss. Let us first consider the process of valley development in massive, unjointed rocks.

If a main stream incises itself with such rapidity that the walls weather back but slightly before a deep trench is cut, the stream will come to flow in a narrow chasm with more or less nearly vertical walls. The width of such a chasm is little if any greater than the width of the stream. Tributaries may entrench themselves more slowly, and so give rise to lateral hanging valleys. If we imagine weathering to proceed more rapidly, the walls of this valley will retreat as the stream cuts downward. Two factors operate to make the higher portions of the walls retreat farther than the lower portions. First, the higher portions are exposed to the influence of the weather for a longer time. Second, a greater transverse breadth of rock is in unstable equilibrium near the top of a narrow chasm than near the bottom. Just at the stream level no rock is in an unstable position, and weathering must proceed very slowly where gravity has little or no chance to remove the rock fragments. Hence, valley widening due to weathering is at a minimum at stream level. A little above the stream level a narrow segment of rock on each side is liable to fall down into the stream as fast as its parts are loosened by weathering. Here the valley may be widened slightly, due to weathering alone. The corresponding segment of rock which is liable to weather from still higher levels is much greater; so that the top of a valley may weather to a width of a mile or more while the bottom remains the width of the stream itself.

The above is perhaps an over elaborate statement of the well recognized relation between stream incision and weathering which results in the V-shaped cross-profile of most young stream valleys. It should not be inferred that the young stream does no lateral cutting while entrenching itself, for lateral erosion lends its aid to weathering in producing the width of the valley. But during the youth of a stream, when down-cutting is active, the effect of lateral cutting is ordinarily obscured by the far greater work of weathering. It is fair to say that during youth, valley deepening is largely due to stream cutting, valley widening largely due to weathering; whence it follows that a young stream cannot develop a broad, flat valley floor. Beginning with maturity, valley deepening becomes of small importance, and valley widening may be due more to lateral cutting than to weathering. A flat valley floor, many times the width of the stream, may be developed.

Let us now consider whether the above principles are modified in case the valley walls are intersected by joint planes. In order that joint planes may produce the greatest effect upon erosion forms, they must be neither too widely nor too closely spaced. If too widely

spaced, much of the valley will be carved in massive, unjointed rocks. If too closely spaced, the rock mass will be so badly broken up as to constitute an area of relatively non-resistant material of fairly uniform character; and only minor features of form will show the effect of joint control. Let us imagine, then, a region of massive rock, such as granite, traversed in several directions by joint planes of such frequency as to make the included joint blocks of large, but not excessive size. The process of weathering will certainly be facilitated by the jointing; but it does not appear that this structure can produce any essential modification of the ultimate result. Joint planes sloping toward the stream will allow weathering and gravity, to remove the granite blocks which are in an unstable position more quickly than would weathering in unjointed granite. The open V-shaped cross-profile will be the more quickly attained. But the large joint blocks at stream level are in a stable position, and no process of normal weathering is known which would pry them out of so secure a place against the pull of gravity, in order to widen the bottom of the V. They cannot be washed away by the stream itself. Whether massive or broken by joint planes, the rocks in the bottom of a gorge must wear away little by little, even though great joint blocks may fall from unstable positions high up on the valley walls. This holds true, no matter what varieties of jointing we imagine to exist. Vertical joints will leave temporary, vertical faces wherever a joint block falls from place. A vertical face is unstable, however, and must slowly weather back to a more gentle slope. If a stream quickly incises itself in vertically jointed rocks, we may have a narrow chasm with vertical walls. But as soon as weathering makes its effects apparent, we must have a markedly greater width at the top of the gorge than at the bottom, the latter remaining narrow so long as the stream is youthful.

Returning to the case of the Yosemite Valley, we observe an undoubted characteristic of youth in the hanging valleys. Yet the width of the main valley cannot be largely due to weathering, since the valley floor is broad and flat. Joint planes, such as would facilitate weathering, are present in the valley walls, and are evidently influencing the weathering now in process. But no process of weathering in jointed rocks can account for the great width of the valley floor. The hanging valleys confirm the conclusion that the width of the Yosemite is not due to weathering; for stream courses descending a valley wall are worn back, by erosion and weathering combined, at a faster rate than are the interstream areas where weathering alone is active. If the walls of the Yosemite had retreated by weathering, the

tributary streams, and especially the larger ones, should have cut so far back from the main valley as to have destroyed the hanging valley effect. Instead, we find the tributaries cascading down the main valley walls, or descending in slight re-entrants formed by the rapid breaking away of joint blocks which occupied unstable positions in the steep valley walls.

One can conceive that valley widening in jointed rocks due to lateral cutting by a shifting stream of early mature age might give a flat-floored, steep-walled valley; for when down-cutting is reduced to a comparatively negligible quantity, lateral cutting at approximately one level will widen the valley floor by undermining the valley walls. Granted the favorable combination of a graded, shifting stream eroding laterally with vigor, and rock walls which weather slowly in comparison with the rate of undercutting and which are traversed by vertical planes of weakness, we can imagine the removal of the valley walls to take place in such a manner as to leave vertical faces on the retreating cliffs.

That the broad floor and steep walls of the Yosemite Valley cannot have this origin is evident from the existence of the hanging valleys. The latter would have been reduced to grade before the Merced River could have accomplished so great a work as the grading of its course and the undermining of its walls by lateral cutting. The existence on the same stream of hanging valleys, a characteristic of young streams, and an open valley floor, a characteristic of mature streams, demands a special explanation.

There is a special set of conditions which may possibly constitute an exception to the above statement. If a stream follows a belt of very weak rock, between masses of very resistant rock, and an uplift permits rapid entrenching, the stream may have time to broaden its valley floor in the weak rock before the tributaries, held up on the hard rock, advance far in the process of grading their courses. That the combination of favorable circumstances necessary for the production of hanging valleys of this type is exceedingly rare, is evident from their almost complete absence in regions of normal stream erosion, even where alternate belts of resistant and non-resistant rock exist. There is no evidence that any strong contrast in rock resistance existed between the granite removed to form the Yosemite Valley and the granite which remains in the valley walls. Jointing will not explain the phenomena unless we imagine a zone of granite so badly jointed and crushed as to give a belt of weak material of the width and pattern of the Yosemite Valley, all of which has been quickly removed, leaving granite of markedly different character in

the present walls. A far more reasonable hypothesis is to regard the Yosemite Valley as one of the many open main valleys with hanging tributaries which characterize every region of Alpine glaciation, and which are reasonably interpreted as the product of glacial over-deepening of pre-existing river valleys.

It may be pointed out that the remarkable effects of jointing observed in the walls of the Yosemite are indirectly due to glacial over-deepening and over-steepening. Not until glacial erosion had made the steep-sided trough, was full opportunity given for the joint blocks to fall from place leaving the angular re-entrants and vertical faces which form such an important element in Yosemite scenery. Weathering and gravity have worked to great advantage in the recent past, and the resultant features are bold and striking. In the future, as the walls wear back to more gentle slopes and the more stable position of the joint blocks causes them to waste gradually away instead of falling in large masses from the cliffs, the valley walls will become cloaked with debris, the bold features of today will give place to more flowing, graded profiles, and the grandeur of Cathedral Rocks, Three Brothers and Half Dome will be a thing of the past. The influence of jointing on weathering is thus to be interpreted as an indirect effect of the glacial origin of the valley, rather than as an important agent in the formation of the valley.

THE NOTCHES BESIDE THE FALLS

As an observer stands in the Yosemite Valley and views the cataract of the Yosemite, Lower Yosemite, Illilouette, Vernal or Nevada Falls, he notes that beside each fall is a deep notch which the stream curiously avoids, to fall over a sheer cliff, as if to provide for man the most stupendous spectacle possible. Branner has given us a good description of this peculiar topographic feature (547-553), and has attributed the formation of the notches to the action of the several streams during a time when they were displaced from their normal positions by ice. A glacier occupied the bottom of each valley, forcing the stream to take a course some distance to one side, where it was held between the ice and the valley wall. While in this position the notch was cut. When the glacier disappeared the stream returned to its former position, leaving the notch deserted. Inasmuch as the stream cut the notch back faster than the glacier eroded its channel, it was argued that glaciers must have very little eroding power, and that the Yosemite Valley must therefore be the result of normal stream erosion in jointed rocks.

The present visitor to the Yosemite may profit by Matthes's excellent topographic map, which was not available when Branner wrote his account of the notches. An inspection of the map, suggests the necessity of some modification of this author's interpretation, and the field evidence confirms the suggestion. The notches beside Lower Yosemite Falls, Illilouette Falls, and Vernal Falls do open up at a higher level in the floors of the valleys in which they were cut, as required by Branner's theory. But above these notches are no signs of abandoned stream channels, and in the notches are no signs of stream erosion. On the other hand, the notches are seen to result from the normal weathering away of granite along oblique joint planes.

When we remember that over-deepening of the main valley left the steep valley walls (and likewise the rock steps in the main valley) in an unstable condition, it is easy to realize how the granite would break down rapidly wherever cut into blocks by jointing; and how successive blocks breaking from the lips of hanging

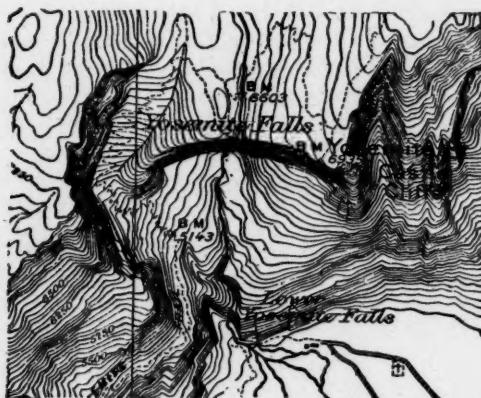


FIG. 4—Yosemite Falls. Showing abandoned stream-carved notch to the west, through which the trail passes. West of the Lower Yosemite Falls is a notch due to weathering along joint planes.

valleys would leave oblique scarps in case principal joint planes intersected the axes of the valleys at oblique angles. An oblique scarp meeting the valley wall on one side of the stream would give such a notch as we find at each of the three falls in question. The notches at Vernal Falls (Fig. 6) and Lower Yosemite Falls (Fig. 4) are developed on NW-SE joints belonging to the same system as the joint which gives form to the southwest face of Mt. Broderick and Liberty Cap. The notch at Illilouette Falls (Fig. 5) is due to a NE-SW joint plane, similar in direction to those which appear at Nevada Falls and on the steep face of Half Dome.

The notch at Nevada Falls (Fig. 6) is undoubtedly a stream carved notch, but it does not open on the side of the valley wall as represented in Branner's sketch map. Indeed, it opens so squarely in the

bottom of the valley above the falls that a small part of the water of the Merced River escapes through the notch, diminishing the volume of the falls by so much. The size and form of the notch, and the large water-worn boulders found in it, indicate that the entire river passed through it at one time. It does not seem necessary to invoke glacial displacement to get the stream in the notch, since part of the stream flows naturally into it even now. A simpler interpretation is that the notch was cut in the bottom of the valley under normal conditions, and that a slight displacement, possibly a glacial advance, turned the stream into its present course over the cliff.

The notch beside the Upper Yosemite Falls is similar in origin to that beside the Nevada Falls. Yosemite Creek formerly flowed through the notch, but was shifted to its present position, doubtless by a late advance of the Yosemite Creek Glacier. It would seem that Yosemite Creek acquired its abnormal position earlier than did the Merced River at Nevada Falls, since the creek has had time to entrench itself to a noticeable extent, although the probable former course of the creek may still be observed in the depression above the notch which is followed by the trail for some distance.

The existence of two distinct types of notches beside the falls in the Yosemite region is clearly shown by Matthes's map, from which the above figures are reproduced. In fact, my first appreciation of their dual character came from a study of the map. After this paper had been prepared for presentation at the geological meetings in Boston during the last convocation week, I learned that Matthes recognized the dual character of the notches during his field work.

Returning to the question as to what evidence the notches offer concerning the relative efficiency of stream and glacial erosion, it should be noted that the notches at Lower Yosemite Falls, Illilouette Falls and Vernal Falls afford no evidence on this question since they were formed independently of stream erosion. The notches at Upper Yosemite Falls and Nevada Falls were carved by stream erosion after the main valley had been over-deepened, and before the



FIG. 5—Illilouette Falls. Showing notch due to weathering along joint planes.

ice advance which displaced the streams to their present positions. According to the theory of glacial erosion the main valley was over-deepened by ice action. Hence the notches are of inter-glacial age—younger than (part of) the glacial deepening of the main valley, and older than the glacial displacement of the streams to their present courses.

Post-glacial cutting has formed only insignificant notches where the streams now pass over the ledges. Making no allowances for

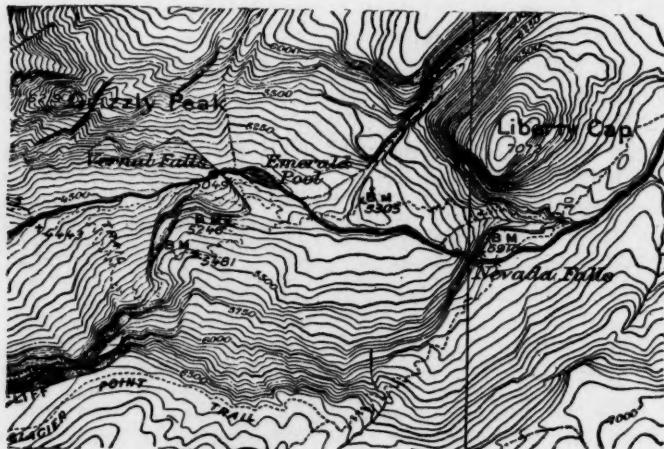


FIG. 6.—Vernal Falls and Nevada Falls. Just south of Vernal Falls is a notch due to weathering along joint planes, while north of Nevada Falls is a notch carved by the stream. Trails pass through both of these notches.

difference in volume and load of streams in inter-glacial time, it would appear from the relative sizes of the notches that post-glacial time has been short as compared with inter-glacial time. On this interpretation the notches afford no evidence one way or the other as to the efficiency of glacial erosion.

CONCLUSION

The Yosemite Valley is a young glacial trough of great depth, whose walls of jointed granite are in a youthful stage of weathering, and whose floor has been maturely aggraded by the main stream. The position of the trough was determined by a preexisting river valley which guided the advancing glacier. Extensive glacial erosion was favored by the shape of the glacial drainage basin, which permitted different ice streams to converge at one point and form the

unusually vigorous Yosemite Glacier. Glacial over-deepening exceeded 2,000 feet in the Yosemite region, and produced the remarkable hanging valleys for which the region is famous. Glacial over-steepening produced the steep valley walls, and made possible the effective weathering along joint planes, to which the details of cliff sculpture are due. Many of the notches in the lips of the hanging valleys are due to the joint-controlled weathering; but some are stream carved notches, deserted by their streams because of glacial interference. Both types of notches are expectable features in the side of a glacial trough located in jointed rocks.

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THE ERUPTION OF TAAL VOLCANO

The following account of the eruption of Taal Volcano on January 30, 1911 is abridged from a paper prepared by Mr. Walter E. Pratt.*

Taal Volcano, in southwestern Luzon, "began throwing out steam and mud on January 27, and continued in eruption with increasing violence during January 28 and 29, culminating in an explosive out-

* *The Philippine Journal of Science*, Vol. VI, 1911, No. 2, pp. 63-83. 3 figs. in text and 14 plates of photo-engravings and maps.

burst early on the morning of January 30, which laid waste the surrounding country over an area of 230 kilometers, killing practically all life within this area. Mud or ashes spread over more than 2,000 square kilometers in southwestern Luzon. The activity diminished gradually to a state of normal quiescence by February 6 to 8."

Mr. Pratt's paper "embodies personal notes made during the two weeks immediately succeeding the eruption. In this time every part of the devastated region was visited. Information as to what happened on the night of the eruption was secured by conversations with people who had witnessed it at close range from different points of view. On January 30, the writer went to Bañadero, a town near the volcano, and during a large part of the subsequent field work Mr. Charles Martin, photographer of the Bureau of Science, was with him. Mr. Martin also was on Volcano Island just before the main eruption. . . .

"Taal Volcano near the center of Lake Bombon may be said to constitute an island with the active crater centrally located on it. Its rim is low, varying from 100 to 320 meters in elevation. Its floor stood just above sea level prior to this last eruption. The volcano is about 60 kilometers south of Manila. The crater has an area of about 3 square kilometers, the island contains about 25 square kilometers, and Lake Bombon covers an area of approximately 320 square kilometers. Each is roughly oval in general outline. There were seven small *barrios* (villages) on the island and Lake Bombon was fringed with the homes of native fishermen and sugar-cane planters. . . .

"There is no evidence that lava ever flowed from Taal Volcano. The crater walls, the island, and the whole surrounding country are composed of bedded volcanic tuff and agglomerates. Volcano Island contains a number of small extinct craters or cinder cones and it is generally conceded that volcanic activity formerly covered the whole area of the present lake, either as a single great crater or more probably, perhaps, as a large number of smaller craters. For a concise discussion of Taal Volcano, its geology and historic eruptions, the reader is referred to the work of Dr. George I. Adams.*

"The first intimation of the approach of the eruption was obtained from the increased size of the cloud of steam which always hangs over the active crater, and also from mild earthquakes. People as far away as Batangas (about 30 kilometers distant) began to be alarmed by these conditions on Friday, January 27. The earth-

* Geological Reconnaissance of Southwestern Luzon. *Philipp. Journ. of Sci.* Sec. A (1910) 5, 57.

quakes increased rapidly in violence and number and, on the following day, the immense white cloud, plainly visible from Batangas, was frequently blackened by the ejection of mud. The cloud rose in explosive outbursts, which were often immediately preceded by a perceptible earthquake shock. A noticeable amount of mud had already fallen on the slopes of the volcano when Mr. Martin reached the island on Sunday morning, January 29. At about 3.30 Sunday afternoon large cracks opened in the earth near the towns of Lemery

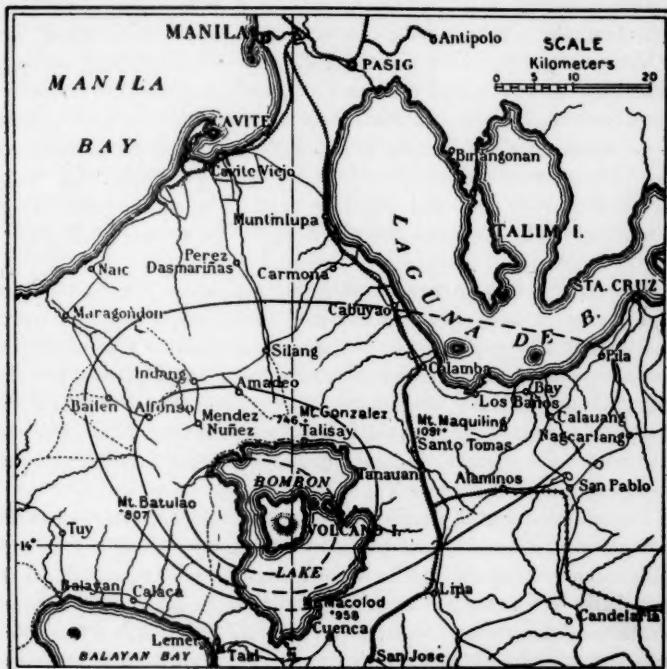


FIG. 1.—Map of a part of Southwestern Luzon showing area covered by mud from the eruption.

and Taal. Probably also the small fissure at Talisay appeared at this time. There were fewer earthquakes recorded on Sunday than on the previous day, although severe shocks accompanied the appearance of the earth fissures. Apparently, the activity of the volcano was slightly lessened on Sunday afternoon. On Sunday evening the activity began to increase again about dark with violent outbursts from the volcano and sharp earthquakes. About 11 P.M. a very severe earthquake was followed closely by the ejection of a massive

black cloud from the volcano. From this time on, it appears, the cloud above the volcano was very frequently crossed and streaked with lightning, and often showed flashes or sheets of light. Some people saw incandescent bodies rising out of the crater and falling in graceful curves to the earth. At 1 o'clock in the morning, another outburst occurred, probably more violent than the one at 11 o'clock, but similar to it. At 2.20 o'clock in the morning, without any severe earthquake, but accompanied by a loud noise, resembling an explosion, the culminating outburst of the eruption took place. The great black cloud shot up higher than before and finally spread out at the top like an umbrella, or a giant cauliflower. The lightning became much more intense, there was much explosive noise and at some places, such as Talisay and San Nicolas, a strong wind came from the volcano. At Bañadero there was little wind, but mud began to fall. Very soon the lake suddenly rose about 2.5 meters. The mud at Bañadero was cool and fell like rain. The activity decreased gradually, and by daylight the cloud from the volcano was again white.

"This main eruption awakened many people in Manila, and in Dagupan, 240 kilometers north of the volcano, people say they were awakened at about this time by hearing a noise. The effect in Manila was that of a tremendous vibration, accompanied by the rattling of windows and loose doors. The noise seemed to pass over the city in a great wave, so that it was heard farther away, after it had ceased close at hand. No earthquake was recorded in Manila at this time."

"The eruption cloud, which rose over the volcano, emerged from the crater with explosive violence, rose rapidly to a great height and finally spread out at the top in a horizontal layer. It is doubtful if its burden of solid ejecta reached a greater height than 3,500 meters. A feature of the movement of this explosive cloud was its terrific sweep downward and outward from the crater rim. The evidence of this movement is obtained from its effect on the vegetation on the lower slopes of the volcano and the west shore of Lake Bombon. The heavy growth of cogon grass was flattened absolutely and patches of forest except where protected by the topography were completely destroyed though not burned. Broken ends of tree stumps and branches were literally shredded as though exposed to the action of a powerful sand blast. Outside the central area over which this explosive expansion of the gases was felt the eruption caused only a rain of mud which fell gently.

"This downward and outward movement is difficult of conception

to those who saw the steadily rising cloud above the volcano during the activity. However, when it is recalled that explosions tend to act equally in all directions, downward as well as upward, and when it is remembered that the air above the crater was already heavy with condensing steam and falling mud when the main explosion occurred, it is apparent that expansion would naturally take place in the manner described. . . . It is probable that at a greater distance from the crater than was attained by this outward expansion, the atmosphere moved toward the volcano, as a center of low pressure resulting from the upward rush of the cloud. Such a movement is evidenced by the sudden falling of barometers around the volcano. In Manila, an otherwise regular barograph at the Weather Bureau Observatory shows a sharp drop of 1 millimeter at the moment of the eruption. At Batangas a similar drop amounted to 2 millimeters. At both these places there was a slight wind toward the volcano after the eruption. . . .

"For an hour or more during the greatest activity the cloud above the volcano was vivid with lightning which played in streaks, often branched or forked, and ran either up or down or obliquely over the cloud. . . . Spectacular electric displays have been prominent features of many volcanic eruptions. Special descriptive names have been applied to this particular type of lightning.* Its origin has been ascribed to the generation of electricity by the intense friction occurring between the individual ash particles in the moving cloud.† Probably friction between ash particles and the air or friction of the vapor-laden gases of the rising cloud with the surrounding drier atmosphere, are contributing causes.

"The earthquakes ‡ accompanying this activity of Taal are tabulated in chronological order in a report "The Eruption of Taal Volcano, January 30, 1911" written by Father Miguel Saderra Masó, Assistant Director of the Weather Bureau. Father Masó concludes that the earth-movements were very local, that they emanated from the immediate vicinity of the volcano and that they lost intensity very rapidly as they traveled away from that center. The most violent earthquakes recorded in Manila were of intensity IV of the earthquake scale of De Rossi Forel § and Father Masó thinks it probable that even in the vicinity of the volcano no shock occurred more intense than VII. || Consequently, a shock of intensity III at

* Hovey, E. O., Martinique and St. Vincent, *Bull. Am. Mus. Nat. Hist.* (1902), 16, 333.

† Scrope, G. P., *Volcanoes*, London, 2 ed. (1862), 57.

‡ The earthquakes in connection with the eruption of Taal will be the subject of a special bulletin of the Philippine Islands Weather Bureau.

§ Strong enough to shake movable objects, chairs, and windows, etc.

|| Strong enough to overturn movable objects, shake off plastering, etc.

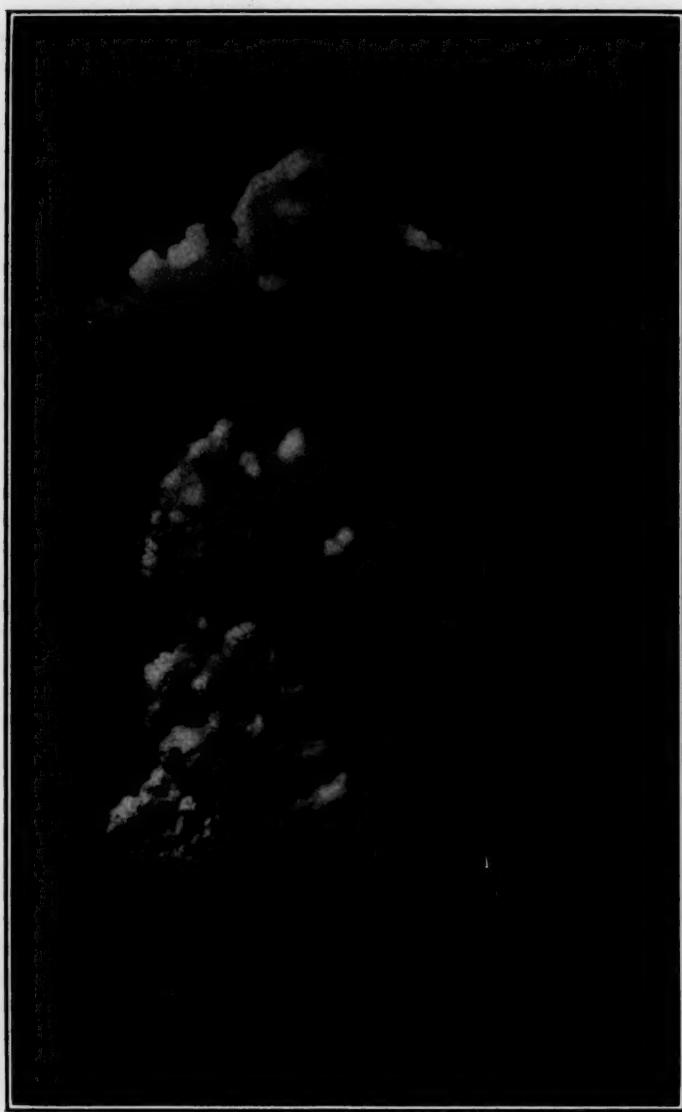


FIG. 2.—Eruption cloud as it appeared from Bañadero, January 30, 1911.

the volcano might not be felt in Manila at all. It is beyond question that a great many more shocks really did occur near the volcano than were recorded in Manila. The local extent of the earthquake shocks suggests that the center of Taal's activity was not at a great depth. . .

"Damage due directly to earthquakes was slight. The towns of Taal and Lemery were most shaken. In Lemery the tower of the Casaysay Church was partly demolished. Masonry gateposts in the wall which surrounds the church were overturned and fell to the west. This church is directly in the line of one of the fissures and some of the damage is evidently due to the vertical displacement along it as the west side dropped. . . Numerous small landslides occurred in the steeply eroded hills of volcanic tuff to the west of Lake Bombon. The shocks cracked and displaced several old masonry walls in Talisay.

"Lake Bombon rose suddenly just after the main eruption. This wave (or series of waves close together) washed up on the lake shore through a vertical distance of 2.5 or 3 meters carrying away houses and causing loss of life in some of the *barrios*. If, as seems established, no severe earthquake occurred for some time before this wave was observed, its cause must be sought in another direction. The whole of Volcano Island sank from 1 to 3 meters. . . It is probable, on the whole, that the island sank gradually, causing only minor earthquakes and very slight disturbance to the lake surface. The explosive rush of gases down the volcano slopes affords a possible explanation of the water wave. This blast, the strength of which is intimated by the absolute destruction it wrought, moved with a considerable downward component (tending to expand equally in all directions) until the moment it reached the lake level. Responding to this downward pressure, the lake surface would be depressed, and its reaction would cause a wave or waves. Thus, the water would have literally been blown away from the volcano to the lake shores.*

"The known ejecta from Taal in this eruption were (1) steam (probably water also), (2) sulphur dioxide, (3) angular pieces of homogeneous extrusive rock, (4) fragmental blocks of volcanic tuffs and agglomerates, and (5) volcanic mud or ash. Steam made up

* It is difficult to estimate the velocity of expansion of the eruption cloud at the time it reached the lake level. Generally accessible data show that a wind velocity of 100 miles (160 kilometers) per hour is sufficient to uproot large trees. Large trees were uprooted 2 kilometers inland from the west lakeshore. Since the velocity must have decreased very rapidly as the expansion progressed, it may have been as high as 200 miles (320 kilometers) per hour at the foot of the volcano. Wind moving with this velocity would exert a pressure of 200 pounds (Trautwine, John C., London, 17 ed. (1900), 321) per square foot (4 kilograms per square centimeter), sufficient actually to support a column of water 1 meter high. This estimate does not take into account the considerable inertia of the dense load of mud or ash which traveled with the wind, and which would increase its effect.

practically the whole volume of the gases. The odor of sulphur dioxide was strong during the eruption and probably this gas or its oxidation product was effective in killing vegetation.* Other gases, notably carbon dioxide, may have been present in the cloud. There was apparently no odor of hydrogen sulphide and there is no evidence of the presence of other inflammable gases.

"The angular boulders thrown out ranged up to perhaps 300 kilograms in weight. The large rocks fell on the upper slopes of the volcano near the crater's rim. Andesitic specimens and others of basaltic character, neither with any appearance of recent fusion, were noted. . . . The blocks of tuff thrown out are identical in appearance with the bedded material of the crater walls. Some of the fragments weigh perhaps 200 kilograms. Other large pieces had broken from the impact of their fall. Bedding planes could be distinguished in many fragments. . . .

"Fig. 1 shows the distribution of solid ejecta from Taal. Three roughly concentric areas have been outlined. The smallest one, 230 square kilometers, includes the devastated region where man and large animals were killed by the direct action of the volcano. It also limits approximately the area over which the fall of mud or ash exceeded 10 centimeters in average thickness. The next larger area is approximately that over which the average thickness of the fall of mud exceeded 1 centimeter. Over the largest area, 1,940 square kilometers, the mud formed a noticeable continuous coating, more than 1 millimeter (approximately) in thickness; beyond this limit it was only visible by close observation.†

"The greatest fall of material within the devastated area was on the west slope of the volcano. The maximum thickness of two meters noted here occurred where the ash and small fragments had drifted into an old water course. However, the ridges adjacent were all but bare, and therefore an estimate of 20 to 30 centimeters for the

* At Bañadero, where cool mud fell without violence to the depth of 1 centimeter, the leaves of the trees retained only a thin coating on their upper surfaces, yet within twelve hours many leaves and some fruit, such as oranges and wild fruits, had fallen, suggesting an effect of poisoning from the mud. Ultimately, all leaves and fruit in this section died. In several instances clothing, such as brown flannel shirts, white towels, etc., on which mud fell at Bañadero, was stained yellow. In San Pablo the fall of mud was very light, "like sugar sprinkled over a cake," yet garden plants were killed by it according to Mr. W. E. Crowe, supervising teacher.

† Comparing these areas to similar areas from the eruption of Mont Pelé in May, 1902 (see Hovey, E. O., *Am. Jour. Sci.* (1902), 14, 320), it develops that Taal devastated more than twice the area that Mont Pelé did, although the eruption was probably of much lesser magnitude. The ashes from Pelé spread over an area probably ten times as great as those from Taal. The crater of Mont Pelé is 1,280 meters above sea level, while Taal in places is as low as 100 meters. Thus the eruption from Mont Pelé had much more room for downward expansion, and the same energy at the crater threw its ejecta much higher in the air than in the case of Taal.

average maximum depth of fall for this vicinity is probably reasonable. . .

"The system of fissures which formed during this eruption is significant of the relation of Taal Volcano to the general structure of the region. This subject has been one of considerable interest to geologists who have studied this area. Centeno* placed Taal on an approximately north and south line with Mount Arayat in the central valley of Luzon north of Manila. Adams† thinks it probable that Mount Arayat is on the same structural line as Taal and argues that the general trend of structure in southwestern Luzon is to the north-

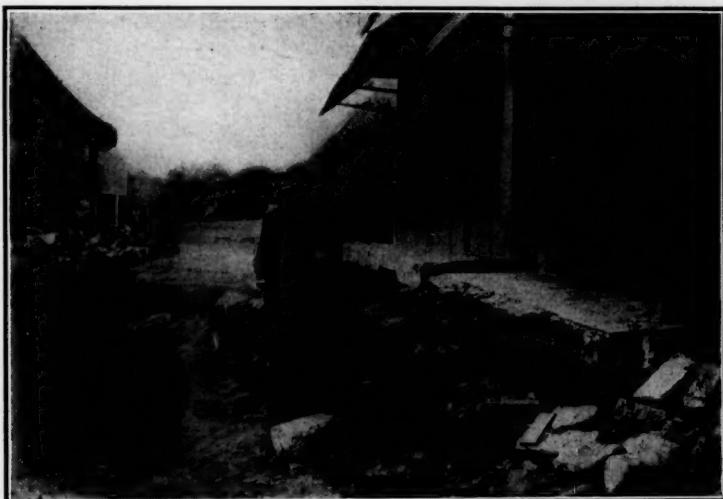


FIG. 3—Fissure in town of Lemery. Looking east.

west. However, he suggests the possibility of a line through Balayan Bay, Taal Volcano, and Laguna de Bay, and sees a possible elevated fault-block in the high ridge north of Lake Bombon and west of such a line.

"The trend of the recent fissuring indicates a line of weakness passing through Taal Volcano and bearing about N. 30° E. This trend extended beyond the limits of the system and runs closely parallel to the east coast of Luzon and the length of Palawan, passing through Laguna de Bay and Balayan Bay. The earthquakes

* *Estudio Geológico del volcán Taal*, Madrid. Tello (1885).

† *Philippine Jour. of Sci. Sec. A* (1910), 5, 102.

were strongest in Taal and Talisay, along this line. The alignment of craters on Volcano Island conforms well with such a trend as do also the outline features of both island and lake. No recent fissure could be traced across the island itself, a fact scarcely explained by the greater fall of ash. If the fissures noted owe their trend entirely to movement radial from the crater their location is still significant, since careful search discovered no other radial fissures around the lake. The fissures are vertical, remarkably regular, and show only a vertical (no lateral) displacement. Where the displacement exceeds about 20 centimeters there is a sharp break and resulting scarp, otherwise only a gentle roll along the line of trend is evident. Generally speaking, the maximum displacement is along the central portion of the fissure, decreasing gradually to each end. It should be noted that displacement did not take place completely at the time the fissures appeared. It increased perceptibly for several days, during which earthquakes were frequent, after the opening of the fissures.

"The two most prominent fissures occur along the bases of the walls of bedded tuff which form the main terraces of the Pancipit River Valley. Their vertical displacements vary up to about 3 meters, and their scarps face each other across the valley. The intermediate fissures have displacements not exceeding 1.5 meters (averaging about 0.8 meter). The whole system bears an evident relation to the existing structure. The intermediate fissures occur on relatively high ground, around which the Pancipit River makes a wide detour to the west. The ground surface slopes to the east, the strata (tuff) dip slightly to the east and the fissure scarps generally face the east. In the town of Lemery, a minor fissure leaves the general trend of the system to follow the contact between the tuff and recent alluvial for a short distance.

"There is a noticeable tendency to maintain the displacement along the trend of the system by alternate parallel fissures. One fissure begins where another ends; thus the system presents a staggered arrangement.*

"Along the main fissure in the town of Lemery the displacement was accomplished by dropping of the lower side, while the upper remained stationary. This is evidenced by the fact that the sea now comes inland farther than formerly on one side of the fissure, and remains at its old level on the other. Whether or not this was the usual occurrence is not certain, but judging from the positions of

* See Hobbs, William Herbert, *Earthquakes*, New York (1907), 72.

the two main fissures and the fact that the displacement generally took place after the earth stresses had apparently been relieved, this instance would be typical. . .

"Little violence, other than sharp earthquakes, seems to have accompanied the formation of these fissures. Natives say that a rush of gas occurred when the large one along the west side of the Pancipit Valley opened. Several people noticed clouds of dust shoot up along other fissures of the system. At Sinaysian, a *barrio* near the seacoast on the large fissure just mentioned, a number of gushing springs were noted soon after it opened. These springs are not exactly on the fissure, but occur irregularly over a small marshy area in the adjacent alluvial formation. On February 18, there were about twenty still very active, gas escaping into the air with considerable noise, and mud and water gushing up to a height of about one-half meter. . . Most of the springs had built up mud cones, perfect craterlets of fragmental tuff, perhaps 2 meters in diameter and 30 centimeters high. Both gas and water were at ordinary temperature. . .

"The most striking subsidence noted was that of Volcano Island itself. Here it was general around the whole perimeter, amounting to more than 3 meters in places. Longos Point was cut in two and the resulting small island is separated by water a meter in depth from the main island. . . A new beach is building over an old sugar-cane field on the southeast shore of the island. Cogon grass and stumps of trees with their roots intact could be seen all around the island beneath about 1 meter of water. The relative level of the lake is changed. It is lower by about 1 meter on its south shore line and is lower by a smaller amount on its north shore. The water in the upper part of the Pancipit River stands at a lower level now than formerly. The subsidence of Volcano Island would tend to lower the level of the lake on its shores but apparently not to such an extent as has occurred. It is not improbable that the whole shore line of the lake has risen slightly, reacting from the subsidence of the island at its center.

"Outwardly, Taal Volcano was little changed by the eruption. The absence of vegetation and the smooth drifted surface of the ash covering which is almost white in the sunlight, give the island an appearance of a vast snow heap. The crater rim is unbroken and save for minor fissures and cracks is intact. Sulphur is burning rather vigorously part way down its outside slope on the north side of the crater. This had never been noted before the eruption.

"The interior of the crater has been transformed. The well-known Green Lake and Yellow Lake, which were small bodies of water, one of which (Yellow Lake) was quite shallow, are gone. In the position of the former Green Lake there is a new one, the water of which appears milky-white, due to suspended solid matter. The level of this lake was on February 17 approximately 70 meters below that of the sea. Green Lake had stood 5 meters above sea level. Two streams of hot water, the combined flow of which was estimated at 100 to 150 cubic meters per minute, were pouring into the lake. These streams came out of the crater walls about 50 meters above the lake level, seeping from just over a layer of fine-grained, impervious, bedded tuff. On the west shore of the lake a conical rock 50 to 70 meters in diameter rose to a height of 115 meters above the lake level. The upper 50 meters of this natural obelisk appeared to be bedded tuff, but the lower portion is massive basalt. A week later, the streams pouring into the crater lake had increased both in volume and in number, and the lake itself had risen apparently about 5 meters. The present lake is boiling at a number of places and great volumes of steam arise from its surface. There is no evidence of a general subsidence in the crater. . . . The new floor, exposed by the streams flowing across it, is composed of dense, basaltic material, hard and flowlike in appearance, certainly in place. It is probable that the change in the level of the crater floor was due to removal of material from the crater, not to the collapse or subsidence of the old floor.

"An approximation of the volume of solid material ejected from Taal Volcano is readily obtained by calculation from the data given in connection with the distribution of the ejecta. Disregarding irregularities in the ground surface, the volume of the solid represented by plotting sections, from the average depths shown, across the area covered, is 70 to 80 million cubic meters. Calculating in a similar manner the volume between the old and the new floor lines in the crater, according to areas and cross sections, the approximate figure of 45 million cubic meters is obtained for the volume removed above the level of the new lake. Examination of the crater walls below the old floor line reveals that a large portion of the material removed was rather dense, bedded tuff. If this material were ground up to a fine sand or ash and spread out in a thin layer, as mud, it would probably occupy at least one and one-half times its former volume, or about 68 million cubic meters. While these figures are approximate and represent at best only the order of magnitude of the volumes sought, yet it is evident that enough surface material was re-

moved from the crater, allowing only a shallow depth for the new lake, to make up the volume of the solid ejecta. The appearance of the ejected mud, its low temperature, and its irregular character, all bear out the conclusion that it consists almost entirely of the material removed from the surface. The few incandescent stones may have come from slightly lower down in the volcanic throat, but even these were probably originally thrown out by former volcanic activity and were only worked over recently . . .

"The official report . . . estimates the human dead at 1,335. There were recovered and buried 732 bodies. Of these, 106 were found on Volcano Island and 618 along the west shore of Lake Bombon between the *barrios* of Subig and Bayungan, inclusive. Taal exerted a devastating violence over an area of approximately 230 square kilometers (part of this area was lake surface; the land surface devastated was about 98 square kilometers). The greatest distance from the volcano at which an appreciable depth of ash fell is about 52 kilometers . . .

RÉSUMÉ

"First, the eruption of Taal Volcano on January 30, 1911, was probably the most severe, considering the number of lives lost and the damage caused, the area of the region affected and the changes wrought in the volcano itself, which has occurred in historic times in the Philippines. It was of the explosive type, the violent activity continuing only a few hours, and the attendant phenomena being typical of this class of eruption.

"Second, the principal ejecta from Taal Volcano during this eruption were steam and volcanic ash or mud. Some incandescent stones were thrown out. The volcanic ash or mud probably resulted from the attrition, by mutual friction within the cloud, of bedded tuff which was torn from the floor of the crater. Little, if any, ejecta came (recently) from a great depth. The mud or ash spread over an area of 2,000 square kilometers.

"Third, the violent action of the eruption was more effective to the west of the volcano, due largely to the contour of the crater rim.

"Fourth, a system of earth fissures opened during the eruption, the trend of which indicates a tectonic line passing through Balayan Bay, Taal Volcano, along the probable fault block, the eastern scarp of which is marked by Mount Gonzales, and through Laguna de Bay. Towns along this line near the volcano suffered most from the earthquakes accompanying the eruption, and are most liable to damage from earthquakes during possible future eruptions.

"Fifth, general subsidence of the ground level took place over a considerable area after this eruption. The island on which the volcano is located subsided and the surrounding lake changed its level. The crater was materially deepened through the removal of material from its floor.

"Sixth, the most significant thing about this eruption is the probability that all its solid ejecta were surface material and the apparent absence even at the seat of volcanic activity of molten lava, which most theories of vulcanism require to account for this type of eruption.

"Seventh, the chief agent of destruction and the main cause of death resulting from the eruption was the explosive expansion of the escaping steam, which was violent owing to its movement and suffocating owing to its heat, its burden of mud, and a content of sulphur dioxide.

GEOGRAPHICAL RECORD

AMERICA

STATE GEOLOGICAL SURVEY OF ILLINOIS. Mr. Frank W. De Wolf, Acting Director, has obliged the Society with the following notes on the progress of the work of the Illinois Geological Survey during the past field season:

Mr. Fred H. Kay, formerly of the U. S. Geological Survey and the Southern Pacific R.R., was added to the force as Assistant State Geologist on July 1. He will especially work on a cooperative study of the mining industry, the other parties being the U. S. Bureau of Mines and the Mining Department of the University of Illinois.

Mr. R. S. Blatchley continued office work on a report on the Eastern Illinois Oil Field. This field produces in the neighborhood of 30,000,000 barrels annually. Mr. G. H. Cady and Prof. U. S. Grant of the Northwestern University were associated on a survey of quadrangles along the Illinois River in the vicinity of LaSalle. These include the section reaching from the Lower Magnesian limestone to the upper part of the Carboniferous and also two or more glacial drifts.

Prof. J. A. Udden of Augustana College, at Rock Island, made a geological survey of a quadrangle at that place. Similarly Prof. T. E. Savage finished work on the Canton Quadrangle in Fulton County.

Prof. Stuart Weller completed a very interesting survey along the Mississippi River, Monroe Co., where exposures occur from the Trenton up to and including the coal measures. The region is considerably folded and faulted and has been sufficiently eroded to offer excellent exposures. It is probably the most interesting region so far examined by members of the Survey.

Mr. E. W. Shaw of the U. S. Geological Survey continued co-operative work

in Illinois and surveyed three quadrangles. The work includes the Carlyle Oil Field on which significant information was obtained.

A new map of Illinois will be issued in a few weeks. It is published by the United States and State Geological Surveys in cooperation on a scale of approximately eight miles to the inch, as a unit in the new world map on the millionth scale. As published by the State, it shows drainage, railroads, county and township lines, and the altitude of various towns. It is the first map of the State to show approximately the correct latitude and longitude for all places. It will serve as a base for the new geological map, but meantime will be distributed as a general-purpose map.

Mr. De Wolf has personally been busy with the preparation of manuscript and direction of the work of field men.

EARLY DUTCH IMMIGRATION TO THE UNITED STATES. The following facts illustrate geographical influence upon the selection of new homes. The years 1846 and 1847 saw the founding of prosperous Dutch colonies in our Middle West. The Rev. H. P. Scholte came in advance of a party of 800 Dutch farmers who sailed for this country in 1847, in order to select suitable lands for them. His pamphlet containing the history of this movement has been translated from the Dutch and appears under the title "Coming of the Hollanders to Iowa" (*The Iowa Journal of History and Politics*, The State Historical Society of Iowa, Vol. IX, 1911, pp. 528-574, Iowa City). The colony settled on prairie lands about fifteen miles southwest of Des Moines, Iowa, after Mr. Scholte had visited Michigan where he found nearly all the land covered with timber. He wrote that to the farmer who had spent most of his life in the level hay lands and fields of Holland, the battle with trees and the constant view of stumps in the midst of meadows and cultivated fields would not be agreeable. The virgin forests were cool and there was pleasure in hearing the warble of birds, but the Hollanders would much prefer to buy soils more suitable for farms and easier to cultivate. The Dutch farmers whom he represented were especially eager to possess pastures and milk cows as in Holland and to use plow and harrow on the land and they were not at all inclined to prefer ax to spade or to become dealers in wood.

POPULATION OF CANADA. Press despatches from Ottawa report that the population of the Dominion according to a preliminary statement based on the census of June, 1911, is about 7,150,000. The census of 1901 showed a population of about 5,370,000. The present totals by provinces are, in round numbers: Prince Edward Island, 94,000; Nova Scotia, 462,000; New Brunswick, 352,000; Quebec, 2,000,000; Ontario, 2,520,000; Manitoba, 455,000; Saskatchewan, 454,000; Alberta, 373,000; British Columbia, 363,000; North-West Territories (exclusive of Yukon), 10,000 [?] (20,000 in 1901). These figures represent an increase, in ten years, of 518 per cent. for Alberta, 504 per cent. for Saskatchewan, 203 per cent. for British Columbia and 178 per cent. for Manitoba, and, in five years, of 202 per cent. for Alberta, 177 per cent. for Saskatchewan and 124 per cent. for Manitoba. The population of Montreal is 466,000, and of Toronto 376,000. Winnipeg has grown from 42,000 to 135,000 in a decade.

W. L. G. J.

PROGRESS OF THE GRAND TRUNK PACIFIC R.R. The President of this railroad predicts that it will be completed from the Atlantic to the Pacific in 1914—fully a year earlier than hitherto allowed. From Winnipeg to Edmonton 95 per cent.

of the territory traversed by the line is said to be good wheat-growing, mixed farming land, and for 150 miles west of Edmonton there is excellent land. Great progress has been made with the line running through the clay belt of Northern Ontario, where again on both sides of the line good farming land prevails. The Grand Trunk Pacific will be able to assist materially the movement of the western crop this year, and the company, which has immense elevators at Fort William, expects to carry at least 12,000,000 bushels of wheat to the head of the Great Lakes. Unlike other trans-continental lines which at the outset were content with pioneer lines, which had to be rebuilt as the traffic grew, the Grand Trunk has constructed from the outset a permanent road-bed. (*United Empire*, Vol. II, 1911, p. 660.)

AFRICA

THE HEIGHT OF RUWENZORI. Capt. E. O. Henrici, R.E., communicated a paper at the meeting of the British Association in Portsmouth on the height of this range in Central Africa. The data upon which the computation was based were obtained by Capt. Jack in the course of observations made during geodetic work in Africa. The initial mark with reference to which the heights were determined was the station peg at Lake Albert Station. The position of the highest point of the range was determined as $0^{\circ}23'10''$ N. Lat. and $29^{\circ}52'15''$ E. Long. The calculations give the height of this point as 16,801.3 feet with a probable error of ± 5.3 feet. The height from the best trigonometrical data obtained up to March 1907 was 16,619 feet; height as determined barometrically by the Duke of the Abruzzi, 16,814 feet.

MEMORIAL TO MUNGO PARK AND RICHARD LANDER. It is proposed to erect a memorial to Mungo Park and Richard Lander. A committee has been formed consisting of Lord Curzon, Sir George T. Goldie, Lord Scarbrough, Major Leonard Darwin, Sir Walter Egerton, and Sir Hesketh Ball to take the necessary steps to secure funds for this purpose. Both explorers have been honored in their native towns of Selkirk and Truro, but no record of any kind exists in the land to which their lives were consecrated and sacrificed. In appealing for support, the committee remarks: "As the main object of their travels was to discover where the Niger joined the ocean, the most suitable site would seem to be its principal ocean port. It is therefore proposed to erect an obelisk of similar design and dimensions to Cleopatra's Needle on a projecting point of land at Forcados, Southern Nigeria, where it would both attract general attention and serve as a landmark to vessels approaching the port. The total cost is estimated at £2,000, exclusive of the foundations, which it is understood will be undertaken by the Government of Southern Nigeria." Donations may be sent to the honorary treasurer of the fund, Dr. J. Scott Keltie, 1 Savile Row, London. (*Nature*, Vol. 87, 1911, p. 456.)

CYCLOCNES, SUGAR CANE AND INSURANCE. The sugar crop of the island of Mauritius is liable to serious injury by the violent tropical cyclones which occasionally reach that locality. In the study of these cyclones, the late Charles Meldrum spent many years of his life, and the results which he obtained contributed very greatly to our knowledge of the "law of storms." In "The Sugar Industry of Mauritius: a Study in Correlation, Including a Scheme of Insurance of the Cane Crop against Damage by Cyclones" (London, 1910), A. Walter has worked out, in minute detail, a formula whence the total effect of the temper-

ature, rainfall and wind upon the sugar crop may be deduced. It is suggested that this formula be used as a basis for determining the loss due to a cyclone, and that it be applied practically for insurance purposes. The crop yield of 1908, predicted by means of the formula, proved correct within 3%.

R. DEC. WARD.

EUROPE

THE GEOGRAPHICAL EXCURSION FROM WALES TO ITALY. The Davis party in West Europe this summer saw peneplains in Devon, Cornwall and Brittany. At the western edge of the Central Plateau Professor Demangeon of Lille showed them fine interlacing land surfaces of the Limousin and Brive cycles, older and younger, above and below, with the plateau of Mil Vaches above, either a more resistant portion or a peneplain fragment of still earlier age. Within the Central Plateau, lava flows of miocene age lay in Limousin valleys and serve to date the cycle. There were also subdued glaciated mountains in Wales to study, and in Cornwall, Devon and Brittany sea coasts that showed signs enough of retreat at first glance but when the question was fairly put—how much?—confessed to but little. Jersey seemed to afford the widest marine bench at Le Hocq, with a width of barely three miles. Then there was endless vulcanism in the Central plateau, more peneplains and a new geographic term in the Morvan. The Jura must be described less simply than was the custom. Crests of anticlines have been planed off in places, as at the Cluse of St. Sulpice, in a way that strongly suggests a surface of an earlier cycle, perhaps the Limousin. In the mountains about Napf were observed singular similarities to Colorado Canyon topography in structural rock terraces along the valley sides, in spite of the climatic contrasts.

The amiability of our guides put us everywhere in touch with the people. The immediate response of building and especially roofing materials to the country rock was very striking, above all in the more modest structures. Pronounced cleavage in the rock yields veritable boards of rock used in building and fencing, alike in the slates of Welsh Bethesda and the schists of Italian-Swiss Biasca. In the Central Plateau where wood was formerly more abundant, a few old houses have roofs of shingles.

As far as the Alps the party enjoyed superb open weather, and the walk up the Häslital was all the finer for the snow mantle cast on the summits by the rain that closed the week before in the mountains north of the Alps. The weather on the Italian side was impracticable after the first two days. About thirty persons took part in the expedition, ten French, six English, five Germans, two each from Switzerland, Italy and America and one each from Norway, Japan, Servia and Russian Poland. Among the best known names were Marr, Chisholm, Strahan, Gallois, Glangeaud, Helland, Demangeon, Vacher and Denis.

The party changed somewhat from day to day, never having less than five members and rarely more than ten. Only Professor Davis, Messrs. Praesent and Waldbaur and the writer made the whole journey, which was as enjoyable socially as geographically. An interesting but by no means typical event was a course breakfast on the summit of Puy Sancy just before which Professor Helland was able to inform Professor Davis that the latter had just been honored with the doctorate of the University of Christiania. MARK JEFFERSON.

LIGHTNING STROKES AND TELEPHONES. In a recent investigation of the question whether or not damage by lightning is increasing in Prussia, K. Langbeck concludes that the decrease which he finds well marked during the past few years in cities is due to the great extension of overhead telephone wires. The removal of the overhead wires into underground conduits will, the author believes, be followed by an increase in lightning damage (*Met. Zeitschrift*, July, 1911).

R. DEC. WARD.

POLAR

DISAPPEARANCE OF THE ANCIENT ICELANDIC COLONY OF GREENLAND. The problem as to what became of the Icelandic colony which disappeared from Greenland in the fifteenth century, the solution of which may be materially advanced by the discovery of European-looking people on the south coast of Victoria Island (69° N. and 115° W.) by V. Stefánsson, as reported in the *Bulletin* for October (Vol. 43, pp. 771-772) is ably dealt with in a paper translated from the Danish and published in the *Deutsche Rundschau für Geographie* (Vol. 33, 1911, pp. 497-507), by Dr. G. Meldorf, late physician of the District of Julianehaab. A comprehensive survey of the literature of the subject and a consideration of all the factors involved lead Dr. Meldorf to conclude that the members of the colony were not massacred by the Eskimos, as sometimes suggested.

He says that for eighty years pirates of the Atlantic (Russian, English and others) put an end to all intercourse between Scandinavia and her colonies. Pirates ravaged the coast towns of Norway between 1393 and 1429, among their exploits being the burning of the port of Bergen and the massacre of its inhabitants. Two generations elapsed before Norwegian vessels again ventured to visit Iceland, Greenland, or even the Faroe and Orkney Islands. Meanwhile, according to Dr. Meldorf's deductions from the information he has collected, European pirates descended upon Greenland, killed many of the colonists and made away with much of their property. He quotes from G. Holm and Daniel Brunn to show that they share his view that although most of the colonists were murdered by pirates a remnant of them escaped to the Eskimos further north, were received into their families and taught the Eskimo arts of hunting and of living without the agriculture which they had practiced in their South Greenland homes; and so, perhaps, some hundreds of these colonists became merged with the natives, introducing a strain of white blood among a section of the Eskimos.

CAPT. BERNIER'S RETURN FROM THE ARCTIC. Capt. Bernier, in command of the Canadian Government steamer *Arctic*, arrived at Quebec on Sept. 29 upon his return from his voyage to the far north. He reached a point within twenty-five miles of the Banks Land entrance to the Northwest Passage, at $74^{\circ}29'$ N. lat., 116° W. long. He found the ice conditions so bad that he was unable to attempt to reach the Pacific by that route. The expedition surveyed the 300 miles of unexplored coast from Cape Kater to Fury and Hecla Straits.

MORE NEWS FROM STEFÁNSSON. The American Museum of Natural History has received a letter from Mr. Stefánsson supplementing the information which he sent to this Society in letters dated from Oct. 20, 1910, to Jan. 21, 1911. (*Bull.* Oct., pp. 771-775). By March last sufficient food had been obtained by Stefánsson and Anderson for the two white men, two Eskimos and seven dogs on their 250 mile journey from the Dease River to Coronation Gulf. Their route lay up

the Dease River Valley, the west end of Dismal Lake and then above the Lake to its east end, thence overland to the Coppermine River and down it to Bloody Falls, whence they crossed overland to the sea near the mouth of Richardson River. They found the ice rough on the Coppermine River and very difficult for sledging. Coronation Gulf was found to contain at least three or four times as many islands as the chart indicated. Driftwood for camp fires was found on the islands, but very little on the main land east of the Coppermine River. In their search for Eskimos the explorers followed the chain of islands eastward, observing the country with field glasses for snow villages. They finally discovered two Eskimo villages near the middle of Coronation Gulf and north of the mouth of Tree River. Each village contained about eighty inhabitants. With the exception of one man who had visited Dismal Lake no person in the village had ever seen a white man. The grandfathers of two of the natives, however, had seen white men or Indians at one time on the lower Coppermine. It was Stefánsson's plan to start late in April to visit all the Eskimos living on the coast of Victoria Land. Dr. Anderson expected to spend the past summer collecting along the shores of Coronation Gulf and Victoria Land and to bring his trophies out by schooner in August.

DR. MAWSON'S ANTARCTIC EXPEDITION. The *Geographical Journal* (October, 1911), says the total contributions of the Australian government to Dr. Mawson's Antarctic Expedition amount to \$110,000. The Royal Geographical Society gave \$10,000. The total funds about Nov. 1 were \$215,000. The expedition was expected to sail for Wilkes Land about Nov. 27.

Dr. Mawson's ship the *Aurora* is 165 feet long, 30 feet broad, with a depth of 18 feet and gross register of 580 tons. She is fitted with a compound engine of 98 nominal horse power and is capable of a speed of nine knots an hour. Under steam she consumes eleven tons of coal a day. For Antarctic sailing purposes her rig has been altered from that of a schooner to that of a barkantine. Her aft has been remodelled to serve the requirements of the large scientific staff she will carry from Hobart. Most of the staff will join the expedition in Australia, the only members that sailed from England on the *Aurora*, besides the ship's officers, being Dr. Mertz, a Swiss zoologist who is an experienced mountaineer, and Lieut. Ninnis who will take part in the survey work. A valuable equipment for magnetic work has been loaned by the Carnegie Institution. The *Aurora* carried from England forty-eight Greenland dogs and a large number of Norwegian built sledges, as well as the bulk of the stores and food supplies for the three parties which it is hoped to land between Cape Adare and the Gaussberg.

PERSONAL

Dr. C. Willard Hayes, Chief Geologist of the U. S. Geological Survey, has retired to engage in technological work in Mexico. He will be succeeded as Chief Geologist by Mr. Waldemar Lindgren who has been connected with the U. S. Geological Survey since 1894. He is author of some fifty Reports published by the Survey.

OBITUARY

DR. DON FLORENTINO AMEGHINO. La Sociedad Cientifica Argentina announces the death of Dr. Don Florentino Ameghino, Director of the National Museum at Buenos Aires on Aug. 6, 1911.

GENERAL

THE GEOGRAPHICAL CONGRESS POSTPONED. A cable despatch received by the Society on Sept. 23 announced that the Tenth International Geographical Congress which was to have been held in Rome on Oct. 15-22 had been postponed until the spring of 1912. The despatch was signed by the Marquis Raffaele Cappelli, President of the Congress and of the Italian Geographical Society.

EXCURSIONS OF THE GEOGRAPHICAL SOCIETY OF CHICAGO. A feature of the work of this society is the excursions planned for its members by a special committee. In addition to excursions regularly provided by the committee, special excursions of an educational nature are undertaken upon written request of not less than ten members. Among the excursions planned for this fall are those to Warren's Woods, Three Oaks, Michigan, at the height of autumnal coloration; to Rock River, a trip of great interest from the standpoint of scenery and physiography; and two field excursions, one to the dune region of northern Indiana and one to the morainic region in northeastern Illinois.

MAPS FOR AIRSHIPS. In the Geography section of the British Association at its recent meeting a discussion was introduced by Mr. C. Lallemand, President of the French Association for the Advancement of Science, who described the resolutions recently adopted at his suggestion by the permanent Committee for Aerial Navigation of the Public Works Department of the French Government on the subject of the production of an international air map and the establishment of marks required by airmen. Many opinions upon the features to be included and eliminated were expressed, and the importance of cooperation between the cartographer and the airmen was emphasized. Mr. Lallemand pointed out that if other countries followed the example of France, international agreements would be necessary to fix conventional signs for the map and other details, and the President of the Section expressed the view that, while much more experiment was necessary before unanimity could be arrived at, there was a tendency to agree on main lines.

GEOGRAPHICAL LITERATURE AND MAPS

(INCLUDING ACCESSIONS TO THE LIBRARY)

BOOK REVIEWS AND NOTICES

(The size of books is given in inches to the nearest half inch.)

NORTH AMERICA

Yosemite Trails. Camp and Pack Train in the Yosemite Region of the Sierra Nevada. By J. Smeaton Chase. x and 354 pp., map and index. Houghton, Mifflin Company, Boston and New York, 1911. \$2. 8½ x 5½.

The nature-loving public may be divided into two classes, those who have been to the Yosemite Valley and those who have not. To the former Mr. Chase's book will be not only a delightful reminder, but an amazing revelation of what lies hidden from those who have not the seeing eye. As a first visit to the Yosemite marks a crisis in one's life, those who would gain most from the experience should face it with head and heart—awake to the abounding life and loveliness of this Sierra region. Such mental and spiritual alertness is born only of knowledge; it is therefore pages like these that serve to put the prospective traveler on his mettle, as it were, against the unthinking receptive attitude of the ordinary tourist.

Mr. Chase writes with a buoyant intensity of appreciation and an exuberant imagination that cannot fail to strike fire from the duller sensibilities of the best of us. He sees not merely the form and color of flower, rock, and tree, but he individualizes each and discerns its characteristics with unerring insight. Some may take issue with him on the ground that he sees more than Nature put there, but, like the poet he is, he has recognized the instinct that "climbs to a soul in grass and flowers" and has tried to express it. On this account his occasional repetitions may be treated indulgently, not so his historic inaccuracy on page 35. There he says Sequoyah "achieved the feat of reducing the Indian languages to eighty-six syllabic characters." He therefore assumes that Sequoyah reduced *all* the Indian languages, whereas he knew Cherokee only, and made his syllabary to fit that.

The book is divided into two parts. In Part I, which treats of the Yosemite and the Sequoias, the author writes *con amore* of the matchless coniferous forests, perhaps because, as he says, "the forest is not a sight, and the forest frame of mind is not a wide-eyed wondering frame of mind," thus subtly characterizing the attitude of those who "do" the Park on schedule time. Part II describes at length a month's expedition to the lake-land of the High Sierra, the route of which is traced on a fairly clear map. This portion of the book aims to be a guide to almost unknown areas of the locality,—and the details of the outfit and line of march are given with freshness and sincerity of purpose. All of the pictures illustrate the text, and a few are exceptional examples of photographic art.

C. W. HOTCHKISS.

La Paroisse de St. Romuald d'Etchemin, avant et depuis son érection. Par l'abbé Benj. Demers. 396, pp., maps and illustrations. J. A. K. Laflamme, Imprimeur, Quebec, 1906. 8½ x 6.

A worthy contribution to the history of early Canada. The parish of St. Romuald d'Etchemin lies along the southern bank of the St. Lawrence River about four miles to the west of Quebec. In the spring of 1651 a few Frenchmen established a fishery at this place, the first white enterprise there. The book tells what is known of the conditions in this region before white settlement and since that time. The history of this small settlement illustrates the story of French development, the early enterprises of the hardy pioneers who were undaunted amid much suffering and sometimes danger. We have had from Canada few narratives of this kind more graphic, informing and interesting than this.

SOUTH AMERICA

Brazil. By Pierre Denis. Translated and with a Historical Chapter, by Bernard Miall, and a supplementary chapter by Dawson A. Vindin. 382 pp., maps and illustrations. Imported by Charles Scribner's Sons, New York, 1911. \$3. 9 x 6.

The French edition of this work, "Le Brésil au XXe Siècle," was reviewed in the *Bulletin* No. 8, pp. 626-628. It is an admirable book, comparable in the solidity of the author's insight and the adequacy of its treatment to Bryce's American Commonwealth. If it has a certain lack of unity so has Brazil, even politically and socially. The nearest thing to a physical unit is the great plateau near the Atlantic coast, low and terribly affected with drought at Ceara in the north, but a half mile above sea in the south and well watered. Here it breaks down to the sea in the granitic Serra do Mar of São Paulo, to the prairies of Rio Grande in the basalt cliffs of the Serra Geral. These southern cliffs hang over the tropical lowland between Espírito Santo and Rio Grande, which man has crossed but never settled. On these cliffs the rains are all too heavy. There hangs a tropic forest as typical as in the basin of the Amazon. Above, the plateau is drier and to the summer is given an intensity among the seasons by the distance from the equator that combines with the dryness of the winter to make São Paulo the finest coffee country in the world. The short period of heat causes all the berries to ripen at once so that here alone can the whole crop be gathered in a single picking, and dry harvest time facilitates the curing of the berry. The best soils are the red earths that result from the decomposition of sheets of basalt.

Here the Paulist landowner holds patriarchal sway over huge estates. A million Italians cultivate the soil without attachment to it, for, with minor exceptions, they can buy no land. They migrate much, at times to the Argentine or back to Europe. A highly protective government brought them at its own expense, protects them fairly from abuse and caps its assistance to the land-owning class by the "valorisation" attempt of 1907, when it bought 8,000,000 sacks of the best coffee to hold for release in worse seasons, having forbidden the extension of the plantations, for overproduction has made the São Paulo problem mainly one of salvation from disaster.

Perhaps more hopeful for Brazil is the government colonization of Paraná, Santa Catharina and Rio Grande. Here is a new democracy of European small proprietors strongly contrasted with the three-century-old Paulist aristocracy,

for it is permanent and growing in prosperity, contentment and numbers. Their task has been hard. They have been sturdily winning from the soil an abundant sustenance that was not wealth for lack of means of communication and exchange. The railroad is solving their problem and transforming their condition. The danger of Germanization here or of Italianization in São Paulo is non-existent. Prosperity removes the very appearance of foreign solidarity.

The hopeless negro masses, the half-breeds of Ceara, wretched in their droughty land, but multiplying amazingly and peopling the Amazon with its scattered rubber gatherers, Brazilian economy and politics are all studied and described. The translator's work is excellent apart from his historical preface. The book has the advantage of maps and illustrations lacking to the French edition and useful if not cohering closely with the text. It will become the standard work on Brazil.

MARK JEFFERSON.

AFRICA

Khont-Hon-Nofer. The Lands of Ethiopia. By H. K. W. Kumm, Ph.D. xi and 282 pp., map and illustrations, bibliography and index. Marshall Brothers, Ltd., London, 1910. 6s. 9 x 5½.

This is the second book by the author on his journey across the Sudan. The first one "From Hausaland to Egypt" (*Bulletin*, XLIII, 535, July, 1911), gives an account of the journey, and while the author does not conceal the fact that the main object of his travels is in the interest of missions, the book is largely an explorer's story. The ethical and religious conclusions of the explorer have been collected in this second book which is dedicated largely to the missionary movement. After reviewing briefly and somewhat sketchily the journey reported in "From Hausaland to Egypt" the author turns to the discussion of the status of the Sudan in modern missions. The history of Mohammedanism, including an account of the rise of the most virile of its branches, Senussiism, is a cumulative warning against the spread of this religion. Then follow chapters on Heathenism in the Sudan, History of Missions in the Sudan, The Success or Otherwise of Missions in Central Africa, Missionary Politics and Strategic Points of the Sudan from the standpoint of the battle against Mohammedanism and Paganism. The discussion covers a great deal of ground and the author has placed in this volume the conclusions which he has derived not only from this trip across Africa, but also from extensive observations in many lands. The condition of the borderland between Mohammedanism and Paganism is clearly described, and the call to battle is a strong one. The book will probably fulfil its intention and stir into action a larger and more united body of workers in this field.

As accessories to the main part of the book are some valuable aids which include besides a number of photographs, a map, a well-considered index and a list of the missionaries in the Sudan, an extensive bibliography of the Sudan containing more than 600 titles, arranged alphabetically by authors.

R. M. BROWN.

Living Speech in Central and South Africa. An Essay Introductory to the Bantu Family of Languages. By A. C. Madan, M.A. 95 pp. Clarendon Press, Oxford, 1911. \$2. 9 x 6.

This is an unexpected contribution to the growing literature of the new philology. No question of priority is at all likely to arise for consideration by

the few zealous students who are doing pioneer discovery work in the new task of adjusting the study of speech to the history of the evolution of man. Yet it is interesting to note that while Mr. Madan has investigated his Bantu theme independently and without any apparent acquaintance with the literature of the new philology, his method was fully detailed by an American student at least five years before the date of the present volume; and in so characteristic a detail as his employment of the seed as representing a more primitive speech unit than the root he will find himself antecedent. He is dealing with the great agglutinative speech family of Africa, and on *a priori* grounds the method of research must be difficult of application, for the language represents an advanced stage in which the maximum reducibility must be to the next inferior type, the isolating. It is because of the action of this principle that the reduction of the inflected languages leads no further than to a source in agglutination. Thus, in carrying out his idea Mr. Madan is led to establish the seed of speech in the consonant structure of the Bantu to which the vowels are applicable with coefficient value as modulants. In the American work upon the great isolating speech of Polynesia the same method of investigation and the same principles of research led to the establishment of the seed of speech in the vowel to which the consonants, as their use is acquired by training of the buccal speech organs, are applied with coefficient value. Inasmuch as the vocal use of the open throat is common to beasts and men, both using vowels; and the consonant is a possession of man alone, save as the appulse of certain animal cries may be interpreted as a movement toward consonant formation; it will be seen that if the ultimate seed of the Bantu speech is the consonant the investigation is barred from approach to the stage where the cry was becoming differentiated into speech. Nevertheless the work will be warmly welcomed as indicating the spread of interest in this newly discovered science of speech.

WILLIAM CHURCHILL.

Report of a Magnetic Survey of South Africa. By J. C. Beattie. ix and 235 pp., maps, charts, and index. Published for The Royal Society, and sold by the Cambridge University Press, London, 1909. 22s. net. 12 x 9½.

Gives the results of the magnetic survey of South Africa, the observations for which extended from 1898 to 1906. The reduction of the astronomical observations was carried out by Dr. Beattie and Mr. V. A. Löwinger. The region surveyed extends from L'Agulhas on the south to Victoria Falls on the north and from Saldanha Bay on the west to Beira on the east. More than 400 stations were occupied.

Wild und Wilde im Herzen Afrikas. Zwölf Jahre Jagd- und Forschungsreisen. Von Hans Schomburgk. Mit einer Kartenbeilage, 8 Voll- und 103 Textbildern nach Originalaufnahmen von Hans Schomburgk und J. McNeil und einem Vorwort von Carl Hagenbeck. xiv and 373 pp. and index. Egon Fleischel & Co., Berlin, 1910. M. 8. 9½ x 6½.

The author has here recorded the results of twelve years hunting in Central Africa, chiefly in German East Africa and in the British regions to the north of the Zambezi River. He lived a long time in the country of the Mashukulumbwe and the many pages he gives to his life and adventures in their land show that conditions there have wonderfully improved since they attacked and

utterly despoiled the expedition of the late Dr. Holub who lost everything he possessed and nearly perished during his retreat out of this inhospitable country. This is one of the best hunting books relating to Africa that has yet been published. The larger part of the photo-engravings are pictures of the game killed.

A Guide to the Antiquities of Upper Egypt from Abydos to the Sudan Frontier. By Arthur E. P. Weigall. xxii and 594 pp., maps, plans, and index. The Macmillan Company, New York, 1910. \$2.50. $7\frac{1}{2}$ x $5\frac{1}{2}$.

This volume cannot fail to be most useful to those who visit the monuments of Upper Egypt. The author, an authority on his subject, is Inspector General of Upper Egypt for the Department of Antiquities, Egyptian Government. Each chapter in the guide book was written in, or in a few cases, only a short distance from the temples or tombs which he describes. The information is derived from prolonged personal observation and is checked by study of the few books relating to the monuments in Upper Egypt. The antiquities he describes are situated between Balianeh, the southernmost town of Middle Egypt and Adendān, the last Egyptian village north of the Anglo-Egyptian Sudan. The book is confined to a description of the ancient remains, an explanation of their purpose, with the addition of some hints as to the best methods of visiting the various sites.

Dans le Sud-Africain et au seuil de l'Afrique Centrale. Par Alfred Bertrand. 71 pp. and 58 illustrations. Librairie J. H. Jeheber, Geneva, 1911. 4 Fr. $8\frac{1}{2}$ x $5\frac{1}{2}$.

A short account of the present aspects of Basutoland, East Griqualand, the country of the Barotsi in the Zambezi Valley and a summary of the results of missionary work in these regions. Though a short sketch, it gives a good idea of present conditions in these parts of South Africa and of the important development that has been attained.

Zur Geologie und Hydrologie von Daressalam und Tanga (Deutsch-Ostafrika). Von W. Koert und F. Tornau. 77 pp., maps and illustrations. Abhandlung der Königlich Preussischen Geologischen Landesanstalt, Neue Folge, Heft 63. Berlin, 1910. M. 7.50. 10 x 7.

This report is based on investigations undertaken in 1902-1905 with a view to furnishing Daressalam and Tanga with an adequate water-supply system. Daressalam is at the same time the chief port of German East Africa and the terminus of the important, and rapidly extending railroad into its interior, while Tanga occupies a like strategic position with reference to the fertile district of Usambara. The report is divided into two parts. The first deals in two chapters with the geology and the hydrology of Daressalam, to which is appended a list of the geologic horizons met with in the various bore holes that were drilled. The second part deals in one chapter with the geology and hydrology of Tanga. The report is accompanied by sketch maps of Daressalam and Tanga, showing the location of the drill-holes, by geological profiles of the territory immediately adjacent to Daressalam and by numerous excellent illustrations from photographs taken by Prof. Uhlig. The report is representative of the detailed systematic work being done in the German colonies.

W. L. G. J.

Die Masai. Ethnographische Monographie eines ostafrikanischen Semitenvolkes. Von M. Merker. xxxi und 456 pp., 89 Figuren, 6 Tafeln, 62 Abbildungen und einer Übersichtskarte. Zweite verbesserte und vermehrte Auflage. Dietrich Reimer (Ernst Vohsen), Berlin, 1910. Mk. 12. 11 x 8.

This second edition, enlarged and even improved, is a fitting memorial to one of the most truly inspired investigators that ever a primitive people has had. In the first edition it was clear that Captain Merker not only knew about the Masai but that he knew the Masai in the life they led. In the five years which elapsed between the first edition and this later production the reading public had advanced to a point where knowledge of the Masai was eagerly sought.

The first edition of this work had been exhausted in three years and there was demand for something yet more complete. In his arduous duties in the Masai highlands Merker renewed his zeal, he found time, or made it, to plan the recasting of the former work with the addition of the store of material which he had newly acquired. Death in that fever-bitten land is never unexpected, but it came suddenly to this busy administrator and scholar. His notes, however, were in such orderly form that it has been possible for his two editors and friends to insert them in their proper places and thus to produce a new work which is abundantly representative of the plans of its author. It is ethnography of the best sort, it is written throughout from the outward glance of the man who practises each of the arts, who follows in his own intelligence each of the customs here so appreciatively recorded. Because the Masai, a nomad people within a wide range, are a Semitic folk, their ethnography has an appeal to the general reader far greater than would be the similar study of any other people of Africa. The condition of their life has been such that they tend to conserve the most archaic customs of the other wandering Semites. They are, therefore, most illuminative of the primitive beliefs of the people whose similar customs have undergone evolution from rigid monotheism into a mystery of triune monotheism which has become numerically one of the greatest of world religions though humblest in its beginning.

WILLIAM CHURCHILL.

Nigeria and Its Tin Fields. By Albert F. Calvert. xvi and 188 pp., maps and illustrations. Edward Stanford, London, 1910. 3s. 6d. 7½ x 5.

This volume is a pioneer book on the development of tin in this English protectorate and, in the main, it is a prospectus of the properties. In Part I the early days in northern Nigeria, development by steamship lines and by the Niger Company, the beginning of tin washing and the discovery of the Bauchi tin wealth are briefly treated; next, the reports on the development of the tin industry and working the mines are discussed, together with the geological report, analysis of the tinstone concentrates, expert reports, possibilities of transport, topography and climate of the Bauchi province, and the question of labor. An examination of the commercial and political outlook follows. The tin deposits are scattered over 2,500 square miles and the tin is considered better than the Straits' tin. The Bauchi province is over 3,500 feet above sea level, is hundreds of miles from malarial swamps and is a healthful and fertile district. The chief drawback is the inaccessibility of the field and the difficulties of transportation. The author discusses the cost of transport and enumerates the railroad lines of Nigeria. The Government is said to be projecting a line from the Baro-Kano railroad to the center of the tin district, about 125 miles.

Part II is headed "Particulars of Companies working tin properties in Northern Nigeria." In this section, twenty or more companies are listed, each report being in the form of a prospectus, showing capital invested, naming directors and describing the areas under the control of the various companies. Part III is a copy of the new mining regulations for Northern Nigeria. At the end of the book and comprising about two-fifths of it, are pictures and plates. Among them are 234 photographs, mostly of scenes throughout Nigeria, four maps which show Southern Nigeria, Northern Nigeria and the railroad routes, and 21 plans of the different tin fields. The book also gives much general information concerning the protectorate.

R. M. BROWN.

ASIA

The Call of the Snowy Hispar. A Narrative of Exploration and Mountaineering on the Northern Frontier of India. By William Hunter Workman, M.A., M.D., and Fanny Bullock Workman. With an Appendix by Count Dr. Cesare Calciati and Dr. Mathias Koncza. xvi and 288 pp., maps, illustrations, and index. Charles Scribner's Sons, New York, 1911. 9½ x 6½.

This book is another memorial to the enormous labors of the Workmans in the exploration of the higher Himalayas. The special objective of the expedition of 1908 was the investigation of the Hispar glacier and its tributaries. During previous expeditions the glacier had been seen and the border region had been explored to some extent so that the locality was not altogether a strange one to the explorers. The expedition left Srinagar late in May and early in June was at Hispar, near the lower terminus of the great glacier, by the middle of August reached the head of the Hispar ice field at Hispar Pass, a point which had been attained in a previous expedition, and entered Srinagar again in October.

The book is a story of every detail of the journey, including the equipment, the problem of coolie transport and the arrangement for the commissariat service as well as the accounts of marches and attainments. The absorbing chapters of the book are IV and VII. In the former, the ascent of Triple Cornice Peak, 19,000 feet, by the way of the Haigatum tributary of the Hispar glacier, accompanied by all the dangers of snow-capped mountain peaks, is described, and what words fail to tell of this accomplishment is shown in well selected photographs. Chapter VII is the climax of the book in that it tells of the ascent of the Biafo-Hispar Watershed Peak, 21,350 feet. From a camp 19,100 feet high on the flank of the Peak, two parties set out, Dr. Workman with one porter to visit the lower summit and Mrs. Workman with three assistants to ascend the main peak. Mrs. Workman's feat in reaching the summit along an arrête, sharp and long, was magnificent in that it was successful. Much space is given to the troubles with the coolies and this is justified for the reason "that the province of the explorer is, among other things, to chronicle for the benefit of others the ethnological peculiarities of the inhabitants as well as the features of the regions he investigates." Like the other books of travel written by the Workmans, this book is beautifully illustrated with an abundance of photographs, some of them telephotographs and others panoramic views, which are carefully selected to explain various phases of the journey. An appendix by two trained surveyors gives us a scientific account of the glacier and its tributaries and adds great value to the volume. The map which is the result of their survey is excellent in itself and as a guide to the reader.

It is a far cry from the Karakoram to the Andes, from magnificent accomplishments to a contentious spirit. The newspaper controversy between Mrs. Workman and Miss Peck has not been pleasant reading, and it is a grave mistake to add as the final chapter of the account of this praiseworthy exploration of the Hispar glacier the report of the expedition sent by Mrs. Workman to Peru which showed "that the altitude of the lower summit of Huascaran, claimed to have been ascended by Miss Peck, is some 1,500 feet lower than the highest altitude attained by Mrs. Bullock Workman." R. M. BROWN.

Siberia. A Record of Travel, Climbing, and Exploration. By Samuel Turner, F.R.G.S. With an Introduction by Baron Heyking. 320 pp. with 46 illustrations. Charles Scribner's Sons, New York, 1911. 8 x 5½.

A reprint of a good book written largely from a business man's point of view, but also rendering some geographical service in a neglected part of Siberia, which was reviewed in the *Bulletin*, Vol. 38, 1906, p. 259.

Cyzicus. Being some Account of the History and Antiquities of that City, and of the District Adjacent to it, with the Towns of Apollonia ad Rhyndacum, Miletopolis, Hadrianotherae, Priapus, Zeleia, etc. By F. W. Hasluck. xii and 326 pp., 24 illustrations, 3 maps, appendices, bibliography and index. Cambridge: University Press, 1910. \$3.50. 8½ x 5½.

The first part of the work deals with the topography of the Cyzicus district, the archaeological work that has been done there and the history of the townships around Cyzicus. The endeavor is made to show ancient and modern conditions side by side. A separate chapter is given to the discussion of the road system. The second part treats of the history of Cyzicus. The chief purpose of this careful work is to correlate the available information and put it into convenient form for the use of future archaeological workers in this part of Asia Minor.

The Veddas. By C. G. Seligmann, M.D., and Brenda Z. Seligmann. With a Chapter by C. S. Myers, M.D., D.Sc., and an Appendix by A. Mendis Gunasekara, Mudaliar. xix and 463 pp., illustrations, maps and index. University Press, Cambridge, 1911. \$5. 8½ x 6.

Students of the primitive must feel an interest in the Veddas of Ceylon because they are probably the sole survivors of the lowest scale of social organization. This volume contains the result of the minute examination of this rude folk made by Dr. and Mrs. Seligmann. They have been very painstaking in their research, every note is accompanied with full description of the conditions under which the observation was made. It is excessive straining after accuracy. Just one sample will suffice. On page 50 we find, "these men came up to one of us (C. G. S.), shook hands" and "she tried to feed one of us (B. Z. S.) with yams." By such contrivances it has been possible to make stupid a theme which in itself has a thrill. It is probable that the interested inquirer will read the brilliant work of the brothers Sarasin for the life-story of the Veddas and will turn to this volume for the hard facts. While the manner of presentation is open to serious objection the work is undoubtedly very valuable. The Veddas are undergoing rapid absorption into the surrounding Sinhalese population and there may be no opportunity to subject them to such study as has been bestowed upon them by these observers. This is a storehouse of facts which will stand as the authority for the work of more inspired students. WILLIAM CHURCHILL.

Aus dem Märchenlande von 1001 Nacht. Beobachtungen und Abenteuer eines Geologen in nördlichen Persien. 1. Band. Von Hans Pohlig. xii and 208 pp., illustrations and index. Verlag von Gustav Körner, Leipzig. Mk. 2. 8 x 5½.

The author is Professor of Geology in the University of Bonn. His visit to northwestern Persia was largely to study its geology. He found, upon returning home, that most of his scientific results and many observations of a general nature, had not yet appeared in literature relating to this region. His route was from the Russian Black Sea Port of Novorossinsk (ice free the year around) to Batum; thence to Tiflis, the capital of Trans-Caucasia, thence southward by rail to Erivan and then to Mt. Ararat on the boundary between Trans-Caucasia and the extreme northwest of Persia. He traveled southward to Choi and Tabris and to the latter city he gives the two concluding chapters of the first volume. The book is a general description of his journey, with geological notes along the way, but in this popular account, geology is not more prominently presented than geographical description and characterization of the peoples, their life, well-being, industries, etc. The author comments only on things that are well worth while. It is a very readable and informing book.

Religion und Kultur der Chinesen. Von Wilhelm Grube. vii and 220 pp., and illustrations. Verlag von Rudolf Haupt, Leipzig, 1910. M. 3.

This is a posthumous work and one which makes us sorry that we shall have no more contributions by the author on the subject. He places special emphasis on the fact that, of all ancient civilisations, that of China is, although the most remote, the only one that has survived to this day, in its ancient form. Whatever changes have taken place in China since the oldest times are insignificant in comparison with the astonishing stability of its conditions in general: language and religion, public and domestic life, habits and customs, as we find them illustrated in its uninterrupted historical traditions whose authenticity has been proven as far back as 841 B. C. The geographical isolation of the country is the paramount cause of this astonishing conservatism. Throughout her history China came in contact with only those peoples whose civilisations were inferior to her own. They could not teach her anything, and gave her no competition which would have stimulated progress.

As a compendium of what every student of China ought to know about its religion and cult, no better book than this can be imagined. M. K. GENTHE.

L'Indochine française. Par Henri Russier et Henri Brenier. 356 pp., avec 56 Gravures dans le texte et 4 Cartes hors texte en couleur. Librairie Armand Colin, Paris, 1911. Fr. 4. 7½ x 4½.

In two years this work has passed from a text book of local geography designed for use in the secondary schools of Hanoï in teaching the Indo-Chinese, and this second edition embraces the wider scope of a valuable geographical compendium of the Asiatic possessions of France. How great that colony is may best be shown by comparison with the metropolis; the sum of the areas of the five lands of the peninsula, Tonkin, Annam, Cochinchina, Cambodia and Laos, falls little short of being half as large again as France. Nor is area the only criterion; despite the expenses of the earlier wars of conquest this colony has come into economic importance, the only French colony which is by way

of showing itself profitable to the business community at home, for in the fifteen years for which statistics have been compiled the total exterior commerce has leaped from \$34,000,000 in 1892 to \$98,700,000 in 1908.

More than half of this commerce passes through the port of Saigon, the administrative center, a city which with the inclusion of its overgrown suburb of Cholon has a population of 250,000. The text is brilliantly illustrated, though the good half-tone cuts have received scant justice on the press through neglect of overlays, but the four charts are in better case and are wholly free from the minute pettiness with which so many geographers obscure the salient detail which it is their aim to present. In the chapter dealing with the population of this area the authors have acted wisely in omitting the controversial matter; their account represents the fair mean of that which is most generally accepted, and the disputes are better left to the journals of ethnography. In some glorified and radiant hereafter it may perhaps be hoped that the French will discover the value of the index.

WILLIAM CHURCHILL.

The West in the East from An American Point of View. By Price Collier. ix and 534 pp. Charles Scribner's Sons, New York, 1911. \$1.50. 8 x 5½.

Mr. Collier had a good time in his discovery of Asia, principally in India, for no more than three chapters deal with his traffic with China, Japan and Korea. His narrative is bright, frequently witty, quite as frequently what the English designate "not wholly nice." He deprecates the idea that the ages old Orient can be learned within the travel span of the most interested observer, he deprecates the work of others whom he considers to have offended in that particular; yet he shows no diffidence in solving the most intricate of problems, that racial problem which the centuries have never been able to settle, the problem of the terms on which the whiteskin is to live with the more highly pigmented epidermis. Furthermore, when with a cheap fling at Boston one drops just once into Greek and quotes Pindar's "navel of earth," it is just as well to remember that the Boston at which he jeers can probably spell its Greek correctly, can put the accent on its proper syllable and does not normally write the accent before the *spiritus lenis*, a record of three mistakes in one word. When he passes beyond the province of American English he fares scarcely better. He cites the horse as a "whaler" when the briefest inquiry would have taught him that the name arises from the place of breeding in New South Wales. His pronouns lead him into messes that might easily have been avoided. In his description of a morning ride in India he writes "my tent measures so-and-so — your clothes are laid out, the hot bath is ready." Yet even in the East the best folk take their own baths and are quite careful to wear their own clothes. Those who have given toilsome years to the effort to comprehend an alien culture which always presents some new and unexpected complication are by now reconciled to the books of passing voyagers, but when they think of the effect which such work has upon those at home who comprehend so little of the tragedy at the edges of life they welcome each new book none the more cordially. And the greatest harm is done by the books which are as readable as this.

WILLIAM CHURCHILL.

EUROPE

La Belgique moderne. Terre d'Expériences. Par Henri Charriaut. 390 pp. Ernest Flammarion, Éditeur, Paris, 1910. Fr. 3.50. 7 x 4 1/2.

One of the illuminative and interesting studies of countries of which the house of Ernest Flammarion has published a considerable number. It is only in small part a geographical study. It treats of Belgium in relation to its languages, provincial and communal life, education, political tendencies, the system of land holdings, co-operative enterprises, labor, commerce, etc. In brief, it is the study of a people, their social development, and the influence of their institutions upon them.

Beiträge zur Kenntnis der Höhengrenzen der Vegetation im Mitteleuergebiete. Von Dr. Max Koch. x and 310 pp., bibliography and diagrams. Druck und Verlag C. A. Kaemmerer & Co., Halle a. S., 1910. 9 x 5 1/2.

The results of this study were accepted as a dissertation by the philosophical faculty of the University of Halle. Considerable attention is given to the position of the snow line in various parts of the regions under consideration, and the upper limits of the growth of a large number of plants are given.

Old Country Inns of England. By Henry P. Maskell and Edward W. Gregory. ix and 294 pp., illustrations and index. L. C. Page & Company, Boston, 1911. 8 x 5 1/2.

This topic has never been fully treated. The book gives a classification and description of the old inns which sheltered the English forefathers before the days of rapid transit and served as their usual place for meeting and relaxation. Interwoven with the story of these inns is much of the history of times and manners in the days when they were most important. Many of the old inns are now gone, for few flourished after the railroad succeeded the coaching system. In provincial towns and hamlets, however, there is still a large number of small inns. Among the nineteen chapter headings are "Manorial Inns," "Monastic Inns," "Coaching Inns," "Historic Signs and Historic Inns," "The Inns of Literature and Art," "Haunted Inns," and "Old Inns and their Architecture."

Bathymetrical Survey of the Scottish Fresh-Water Lochs. Conducted under the direction of Sir John Murray and Laurence Pullar during the years 1897 to 1909. Report on the Scientific Results. Vol. I, 785 pp., map, illustrations, bibliography and index; Vol. II, 281 pp., and illustrations; Vols. III-VI, plates. Challenger Office, Edinburgh, 1910. £5 5s. 9 1/2 x 6 1/2.

This great work has been everywhere accepted as the largest and most important contribution to limnology yet made. Much of the material was published in the *Geographical Journal* and the *Scottish Geographical Magazine* before its appearance in book form. The work records the investigation into the bathymetry of the fresh-water lochs or lakes of Scotland between 1897 and 1909. The larger part of the survey was given to the determination of the depths of the lakes and of the forms of their basins. A great many observations, however, were carried out in other branches of limnography. Vol. I, mostly new matter, includes many articles dealing with the results of these studies from the topographical, geological, physical, chemical and biological points of

view. Various theoretical considerations are also advanced, and the Scottish lakes are compared with lakes in other parts of the world. The volume concludes with an exhaustive bibliography of limnological literature which will be invaluable to students of this subject. The special descriptions of the lakes appear in Vol. II, and the maps of them fill the four other volumes. Throughout the text are many maps showing the drainage areas of the districts in which the lakes are situated. All the survey maps were prepared and printed by the Bartholomew map house and are very fine specimens of cartography. Science is much indebted to Sir John Murray and Mr. Laurence Pullar for planning and carrying out this great work of research.

The High-Roads of the Alps. A Motoring Guide to One Hundred Mountain Passes. By Charles L. Freeston, F.R.G.S. Second Edition Revised and Enlarged. xvii and 392 pp., with 110 itineraries, 102 photographic illustrations and 11 maps and diagrams and index. Charles Scribner's Sons, New York, 1911. 8½ x 5½.

An improved edition of this excellent book which was reviewed in the May *Bulletin*, pp. 381-382.

La Vie Politique Orientale en 1909. Par Dr. Georges Samné and Y. M. Goblet. xi and 317 pp., and appendices. Éditions de la "Correspondance D'Orient," Paris, 1910. Fr. 6. 9 x 5½.

A careful review of political and social conditions in Turkey, the Baltic Peninsula and Morocco.* Among the subjects discussed are the Balkan crisis of 1908, Turkey under constitutional government (to which a third of the book is given), affairs in Greece, the Persian Revolution, Egyptian questions and the events of the past two years in Morocco. A chronology of thirty-two pages summarizes the recent history of these countries.

Die Flüsse Deutschlands. Von Ed. Gennerich. Unter Benutzung der von Herrn Geheimrat Keller bearbeiteten Stromwerke. Sonderabdruck aus der *Zeitschrift für Gewässerkunde*, Bd. VIII, Hefte 3 u. 4. 168 pp., Verlag u. Druck von Wilhelm Baensch, Dresden, 1908.

The small volume is an attempt to condense, and make accessible to a wider circle of readers, the contents of the famous standard monographs on the Rivers of Germany. It contains the volumes at low, medium, and high water of each of the more important rivers: Rhine, Ems, Weser, Elbe, Oder, Vistula, Pregel, Memel, and explains their relation to the size, rainfall, soil, vegetation, climate, of the respective drainage areas, together with the grade, average width, and navigation, of the principal inland waterways of Germany. It will be a welcome addition to the reference library of the potamo-geographer who cannot afford to consult the bulky original monographs. M. K. GENTHE.

PHYSICAL GEOGRAPHY

Characteristics of Existing Glaciers. By William Herbert Hobbs. xxiv and 301 pp., maps, illustrations, and index. The Macmillan Company, New York, 1911. \$3.25. 9 x 6.

Scholars in great libraries do not always recognize their responsibility to use their books. This Professor Hobbs has done. He has made a wide survey

of the scattered sources and gathered here an extremely interesting collection of maps, pictures and observations on glaciers and snow fields of all kinds. Surely all students of earth science will thank him for this work and the ample references.

He divides his subject into Mountain Glaciers, Arctic Glaciers and Antarctic Glaciers. In the first he proposes a much-increased attention to cirque formation as the dominant process at high levels. He objects to the name Valley Glaciers because they rarely get far into their valley, lying mostly within the "mother cirque" (p. 52). He would call them rather Radial (Alpine), the second of which names is not new. His classification of Mountain Glaciers under fifteen heads seems to hang together badly. Decreasing snow alimentation is the criterion and it governs 2, 3, 5, 6, 14 and 15 very well if the other nine are omitted.

The large collection of data concerning polar glaciers is of very great value. It is good reading, though so hastily written in places as to be puzzling. Through it runs the thread of a discovery that Professor Hobbs has made about the winds and pressures near the poles. "Unfortunately the theory of polar eddies promulgated by Ferrel and adopted by Davis in his, in many respects, excellent treatise is responsible for a general prevalence of incorrect views concerning the winds of both the earth's polar regions" (p. 265). The 'discovery' is that a local "fixed anticyclone" exists on Greenland and Antarctic, causing outward winds in every direction. So far the discovery is reconcilable with Davis's treatise on meteorology (see p. 231). But Prof. Hobbs holds that the snowfall nourishes the ice sheets by the descent of cirrus ice grains from heights of 14,000 to 25,000 feet down upon the surface, as the cold, heavy, lower air slips off down the slopes of the ice dome. These grains "are melted and vaporized by adiabatic warming and on reaching the cold surface layer of air next the ice are quickly congealed to form flakes of snow" (p. 287). The process is finally checked by too much adiabatic heating, which softens the snow and makes it sticky. Then a long calm allows the heat to radiate away again.

A somewhat headlong seeking for evidence of this process and an ignoring of obvious difficulties mar a very interesting volume, but it remains still a volume of value and interest.

MARK JEFFERSON.

Handbuch der Klimatologie. Von Dr. Julius Hann, Professor an der Universität Wien. Band III. Klimatographie. II. Teil. Klima der Gemässigten Zonen und der Polarzonen. Dritte, wesentlich umgearbeitete und vermehrte Auflage. ix and 713 pp. J. Engelhorn's Nachf. Stuttgart, 1911. 23 marks unbound. 9 x 6 1/2.

No discerning person can look through the final volume of the third edition of Hann's magnificent work without being impressed by the author's absolute mastery of his subject. In these days of the rapid growth of scientific literature, whoever, as a recognized authority, critically summarizes this literature, and thereby makes it accessible to his colleagues, is doing an important work. Hann has, for these many years, been rendering just this kind of invaluable service to all who have been trying to keep up with the rapidly-increasing flood of meteorological and climatological literature. We say "trying to keep up," for it is safe to assert that there is but one man in the world who really succeeds in keeping up. And that one man is Hann. No one who has not made a

serious effort to keep abreast of this literature can appreciate what it means to be the master of it. Yet Hann is much more than a compiler for others, important as that function is acknowledged to be. He does not merely give us a well-digested and readable summary. He is not content with presenting the work of others just as they left it. When published climatological data need revision, correction, reduction, in order to make them scientifically valuable. He carries out that revision. He gives us better, and more, than do many of the original authorities from whom he has collected his data. In addition, his own original researches, covering a very wide range of subjects in meteorology and climatology, carried on for years with marvelous patience and skill, make every page of his published works a store-house of exact and authoritative information.

All who are in any way concerned with the science of the earth's atmosphere will unite in extending their hearty congratulations to the veteran author upon the completion of this work. The volume deals with the climatology of the temperate and polar zones, the second having taken up the tropics. It is absolutely "up to date." Following an excellent custom, the author has noted, at the end of the Appendix, "geschlossen Mai 1911." Thus anyone who wishes to look up any subject on which he needs the latest data, knows exactly where Hann left off, and where he must begin. The final proof was read in May, and the printed volume was in the present reviewer's hands by the middle of July. There are references in the Appendix to articles which appeared in April, 1911. The one great fact which impresses itself upon the reader of this volume is the tremendously wide range of the author's reading, and his remarkable power of assimilation. Nothing seems to have escaped his watchful eyes, or to have been an excessive burden upon his unfailing memory.

It may seem to many that "dry climatological data" cannot possibly be made interesting. Yet our author, by his vivid descriptions of weather types; by his frequent reference to the effects of climate upon vegetation, upon crop distribution and upon human activities; and by his well-chosen quotations (*e. g.*, Middendorff's remarkably vivid description of the Siberian winter cold), has succeeded admirably in giving us a book which is far from being "hard reading." Many general readers will find much to interest them as, for example, the discussion of the winter climates of the Mediterranean health resorts; of possible climatic changes in Palestine; the description of the weather conditions experienced; and the excellent account of the general characteristics of polar climate, in which are embodied the Nansen-Mohn isothermal and isobaric charts of the north polar area. Our increasing interest in South America gives special interest to the admirable account of the extra-tropical climates of that continent, in which are included such recent publications as those of W. G. Davis on the climate of Argentina (1910), and the several noteworthy papers, of anthropogeographic interest, recently published by Prof. Isaiah Bowman, of Yale.

The section on the United States, of nearly 100 pages, is especially worthy of attention. Without detracting in any way from the importance of Prof. A. J. Henry's "Climatology of the United States" (*Bulletin Q*, Weather Bureau), to which Hann acknowledges that he is indebted for much of his information, it may be said that there has been no general recent account of the climates of the United States as good as that contained in this volume. *Bulletin Q* was, of course, intended as a climatological dictionary, rather than as a connected and concise description and analysis of climate. The criticisms which our author makes of the published temperature data for the United States and of the lack

of strictly comparable mean temperatures are justified (Hann has himself reduced some of the temperatures to the 33-year mean), and we are glad to note his appreciation and commendation of the new climatological summaries, by sections. We are especially glad to note the retention, from earlier editions, of Lorin Blodget's description of the general characteristics of the United States climates east of the 100th meridian. Blodget's "Climatology of the United States" is a classic, although almost unknown to the younger generation of meteorologists. Indeed there is much of real climatological interest and value in many of the older accounts of North American travel and exploration, as *e. g.*, in the *Journals* of the Lewis and Clark Expedition. Dr. Fassig's excellent report on the climate and weather of Baltimore receives well-deserved commendation.

R. DEC. WARD.

ECONOMIC GEOGRAPHY

Der Pflanzenbau in den Tropen und Subtropen. Von Professor Dr. Max Fesca. Dritter Band. xiv and 361 pp. Verlag von Wilhelm Süsserott, Berlin. 1911. 8½ x 5½.

The concluding volume of Prof. Dr. Fesca's valuable work on economic plants in tropical and sub-tropical regions. The present volume includes citrus and other fruits, oil yielding plants, gums, spices and aromatics, drugs, rubber, gutta-percha, dye stuffs, tanning stuffs, and barks (varieties of cork). The varieties of each species, the climate and soil suitable to them, their cultivation, uses, diseases, product, etc., are treated concisely without sacrifice of essentials. One hundred and three pages are given to rubber and gutta-percha. The three volumes form an authoritative and comprehensive work on this subject.

The Natural History of Coal. By E. A. Newell Arber. x and 163 pp., illustrations and index. Cambridge University Press, 1911. 1s. 6½ x 5.

This is one of the little "Cambridge Manuals of Science and Literature." The author attempts, with good success, to answer simply such questions as the origin of coal, how it was formed. He also discusses problems relating to the geology or the paleobotany of coal, some of which are not yet solved or at least not satisfactorily elucidated. The book ends with a good bibliography and an index.

ANTHROPOGEOGRAPHY

Influences of Geographic Environment, on the Basis of Ratzel's System of Anthropo-geography. By Ellen Churchill Semple. xvi and 683 pp.; 21 maps. Henry Holt & Co., New York, 1911. \$4.

Ratzel carried the investigation of geographic influences upon man and history a long step forward and embodied much of the fruit of his research in a book; his *Anthropo-Geography*. Moreover, he inspired a pupil to take up the investigation and carry it forward. This was a greater service. That pupil was Miss Ellen C. Semple, an American. To produce a book like this requires a combination of four factors not often within the reach of one person,—deep interest in a great subject, ability to handle it, training, and leisure. Nor does this imply that Miss Semple's book is simply the product of leisure hours. On the contrary, it bears every evidence of having cost a prodigious amount of labor.

The seventeen chapters deal with: The Operation of Geographic Factors in History, Classes of Geographic Influences, Society and the State in Relation to the Land, Movements of Peoples, Geographic Location, Geographic Area, Geographic Boundaries, Coast Peoples, Oceans and Enclosed Seas, Man's Relation to Water, The Anthropogeography of Rivers, Continents and their Peninsulas, Island Peoples, Plains, Steppes and Deserts, Mountain Barriers and their Passes, Mountain Environment, The Influences of Climate upon Man.

Miss Semple, or anyone else, who attempts to estimate the actual weight of geographic influences in the history or development of a people, attempts the impossible. The influences which have directed the course of history are too complicated. The same influences are not equally effective in different periods of history. Whatever part geographic influences had in making Ancient Greece, it is evident that those influences are not effective now, or else they are offset by other and stronger influences which were not operative in ancient times. In her chapter on the Operation of Geographic Factors in History, the author clearly takes the ground that Geographic Influences themselves undergo a process of evolution and that a set of factors which brought about a certain result in an earlier stage of history, may not do it in a later stage.

Unquestionably Miss Semple has tried faithfully to be conservative and guarded in her statements. She believes enthusiastically in her thesis; and there are frequent statements in her book which, if taken literally, seem extravagant. For example, "It was the Danube that, in the fourth century, carried Arianism . . . to the barbarians of Southern Germany and made Unitarians of the Burgundians . . ." Of course, this is a figure of speech, not intended to be taken literally. The author herself says (page 11), "The study of physical environment as a factor in history was unfortunately brought into disrepute by extravagant and ill-founded generalization, before it became the object of investigation according to modern scientific methods." All in all, a careful and friendly reader can not escape the conviction that the author has aimed to be conservative. An unsympathetic reader may not grant that she has always been successful in that endeavor.

One thing that impresses the reader is the enormous breadth of reading, the endless verifying of references, the search and research, the sifting and resifting of material, involved in the preparation of the book. There are nearly 1,500 citations of authorities. The chapter on Island Peoples alone is followed by 223 references. The geographers of the English-speaking world will thank Miss Semple for a generation to come for her splendid work in preparing this bibliography.

There is method in every chapter of the book. The framework stands out clearly and is usually indicated by the marginal sub-heads. General principles are stated, usually as topic sentences of paragraphs, then follow illustrations. The treatment of "Man's Relation to the Water" will illustrate. After laying down the general thesis that man uses the waters of the earth as places for passing and repassing, not for his abiding, the author gives some twenty-five examples of peoples, chiefly among primitive races, who live or lived in pile dwellings, in boats, or who otherwise chose the water rather than the land for an abiding place. Then follow examples of the reclamation of land from the sea as in Holland, or from river floods, as in China; the practice of irrigation in many lands and its socializing and unifying effect upon communities; the effect of coast line and of fishing upon the maritime development of a

people. This formulation of principles—this terse statement in words of great truths which all of us have imperfectly thought out, this collecting of many illustrations—are the qualities in the book which give it substance.

The index is a model of completeness and will add vastly to the usefulness of the book for reference purposes. An idea of the completeness of the index may be gathered from the fact that there are over 100 page references to *Nomads*, twenty-five to *Fur Trade*, fifty to *England* and one hundred to *Boundaries*. There are forty-five double-column pages in the index.

If the reviewer were disposed to look for faults in the book they doubtless might be found. But the great service which Miss Semple has done for Geography, the years of work which the book has cost, the pardonable pride which we feel in knowing that an American Geographer did the work, all impel this reviewer, at least, to dwell upon the excellencies of the book rather than to seek minor points of weakness.

R. H. WHITBECK.

EDUCATIONAL

The Continents and Their People: North America: A Supplementary Geography by J. F. Chamberlain and A. H. Chamberlain. xi and 299 pp., maps, illustrations and index. The Macmillan Company, New York, 1911. 55 cts. $7\frac{1}{2} \times 5$.

Intended "to supplement and enrich the work offered by the text-books in geography." Although the authors in the preface say that "mere statement of fact is not geography" and believe that in their book "cause and consequence have been related" their product shows lack of grasp of the subject and ignorance of modern geographical methods, with the result that the very element of correlation which they claim for their book is excluded. Their indulgence in vague generalities also is unfortunate though typical of too many text-books in geography. The references to the Glacial Period and to various physiographic processes, even if conceded to be justifiable in a book intended for use in grammar schools, are purely casual and confuse rather than further the development of conceptions. The maps are of the usual uncritical type.

W. L. G. J.

Elements of Geology. By Eliot Blackwelder and Harlan H. Barrows. 475 pp., maps, illustrations and index. American Book Company, New York, 1911. \$1.40. $7\frac{1}{2} \times 5$.

The book makes a point of relegating volcanoes and earthquakes to the minor place where they belong, and of presenting its matter in a way to cultivate the reason. In good hands it will probably do so. The questions seem well planned for the purpose. Perhaps it is a little hard on other authors to ask them to admit that they have not had the same intention. Another feature is the introducing the historical part by an account of the chief animal and plant groups, which is a good thing.

Very noticeable in this part is the almost complete omission of cuts or descriptions of fossils. The material used is living, similar forms or restorations of the ancient ones. So far the pendulum has swung. Perhaps this is an over-emphasis, for the geologist is concerned with fossils not a little as mere fossils, marking strata, as they might do were they the mere sports of nature they were once believed to be. Without reference to the living forms that made them, they serve him to establish rock structures and displacements.

A geographer must be delighted with the simplicity of the scheme of North American topographic regions at p. 63. Most such classifications are far too complex. Equally will he welcome the maps of Tertiary mountain folds at p. 438 and Paleozoic ones at 372.

The respect shown the planetesimal theory is natural and acceptable, but when it is said of the nebular hypothesis that it is "improbable that the materials which became the planets could have separated from the equatorial portion of the nebula in the form of rings" the student will be justified in asking "Why not?". Of course he does not ask questions. He does not venture on excursions into reasoning. He sees his author is *against the hypothesis*, and follows the cue!

The summaries after igneous rocks and closing chapters V and VI are good. Similar ones would well close other chapters, too. Why not admit (p. 188 and 230) that streams and glaciers *deposit* as explicitly as it is stated that they *wear* down? In the Great Lake country, above all.

The changed groupings of Eras and Epochs may be necessary with growth, but for school texts it is unfortunate. Since the last text that has come to this reviewer's hand one geologic Era has disappeared—the Algonkian and eight new periods have arisen.

The text-book is a very good one. It lacks a geologic map, but for the rest is well illustrated with abundant good pictures and maps.

MARK JEFFERSON.

Commercial Geography. By Albert Perry Brigham. xv and 469 pp., 17 colored maps, 238 diagrams and illustrations, and index. Ginn & Company, Boston, 1911. \$1.30. 8 x 5½.

Those who are interested in either the study or teaching of geography will welcome this new text from the pen of Prof. Brigham. The author's reputation for scholarly work is sufficient guarantee that in this respect the book is all that could be expected or desired. The treatment of the subject is, however, noticeably different from that in most of the other commercial geographies which have recently appeared.

Part I, an "Introduction to Commercial Geography," covers ninety-two pages, and is devoted to the treatment of wheat, cotton, cattle, iron and coal, and a brief statement of the "Principles of Commercial Geography." The first five of these topics cover the vegetable, animal and mineral products of greatest importance to the American student for whose use the book was primarily prepared. They are so treated as to put him at once into possession of the most significant facts concerning their production, transportation and manufacture. The fact that the people of the United States are greatly interested in all five of these fields of industry makes it possible to base the discussion upon conditions as found in our own country and to draw the illustrations chiefly from United States sources. Foreign countries in which these industries are important are, however, by no means neglected. The chapter on "The Principles of Commercial Geography," although brief, is particularly well placed, as it makes use of the information already obtained concerning the nature and distribution of these important products. The growth of the exchange of products is pointed out, and the constant improvement of transportation and manufacture, as a result of improved standards of living, is noted. The aid and protection which a government seeks to give its people is also commented upon. On the whole

this part forms a most satisfactory introduction to a study of the subject in its details.

Part II is devoted to the "Commercial Geography of the United States." It occupies 186 pages of the text and discusses in order the Plant, Animal and Mineral Industries and the "Water Resources" of our country. This is followed by a consideration of the "Concentration of Industries" and the development of "Centres of General Industry" and the consequent necessity of "Transportation" and "Communication." It closes with a particularly well written and suggestive chapter on "Government and Commerce" and the "Foreign Commerce of the United States." Part II is especially rich in diagrams and illustrations, many of which are new and of great value.

Part III is on the "Commercial Geography of Other Countries." Here the author has avoided the statistical treatment which most books use at this point. Instead, the attention of the student is directed to those countries with which our own maintains close and important commercial relations. Canada is treated first for obvious reasons. This is followed by the "United Kingdom," "France and Belgium," and "The German Empire and the North Sea Countries." In each of these chapters the various topics have been kept in nice balance. The facts in the development of the leading industries have been given enough prominence, so that the student may understand, in part, what the new world owes to the old. The remainder of Europe is treated in two chapters and each of the other continents has a chapter. The book closes with a chapter on "The World's Commerce," which is in part a brief historical review of the development of trade, and in part a statement of the effects of commerce upon society and morals.

The book is beautifully printed and finely and judiciously illustrated.

C. T. MCFARLANE.

Highroads of Geography. The Royal School Series. Book I.—Sunshine and Shower. 128 pp. and ills. 10d.; Book II.—Scouting at Home. 170 pp. and ills. 1s. Thomas Nelson & Sons, London, 1911. 8½ x 6 each.

Simple readers in the elements of geography, designed for beginning pupils. The first book includes lessons in the form of a story framed about a garden in England, in which the water and air at work are studied, followed by descriptions of visits to the mountains and the seashore. The information imparted is given interestingly and clearly and is in general accurate, though an exception must be made to the statement that irregularities in the surface have been made like the wrinkles on a dried-up apple. The illustrations are largely in color and are reproductions of well known masterpieces.

The second book takes up the Boy Scout idea and follows the plan of training children to be scouts, by first presenting in a simple and effective way the meaning and use of maps. This is followed by a series of lessons on the weather, on the erosive processes and the rocks, with a brief treatment of certain industries. The volumes are on an original plan and are well done. They are good, supplementary reading for oral lessons, previous to any use of a text-book.

RICHARD ELWOOD DODGE.

GENERAL

Modern Geography. By Marion I. Newbigin, D.Sc., Editor of the *Scottish Geographical Magazine*. Home University Library of Modern Knowledge, No. 7. 256 pp., maps, diagrams and index. Henry Holt & Co., New York, 1911. 75 cts. 7 x 5.

This book cannot be recommended too strongly to the general reader who wishes to inform himself of the present status of modern geographical science. In nine chapters, to which is added a brief list of standard references, it covers the whole field of geography and points out very clearly what constitutes the distinctive geographic point of view and method. This is accomplished not by an abstract discussion of principles but by an extremely readable presentation of well-chosen examples.

An introductory chapter treats of the beginnings of modern geography, with which the names of Humboldt, Ritter and Darwin are so intimately associated. Two chapters are devoted to the larger features of the relief of the earth's surface and to a discussion of normal and of glacial erosion. The chapter on climate and weather demonstrates the general principles of climatology by means of a characterization of the Mediterranean type. Subsequent chapters on plant and animal geography bring out particularly well the broad aspects of these branches of our subject and afford a welcome relief from the product of writers whose conception of geography still seems to be limited to physiography. A chapter on cultivated plants and domesticated animals leads logically to the discussion of man. Chapter VIII on the races of Europe discusses their present distribution, their origin and the conditions of their environment which have made for differentiation. The final chapter on the distribution of minerals as a potent factor in the localization of industries and in the development of transportation affords an excellent example of the conciseness of statement and the breadth of view characteristic of the book throughout.

The publishers are to be congratulated upon the inception of the series of which this volume forms a part. To judge by the volumes so far published it bids fair to become in English a worthy equal to the well-known "Göschen Sammlung."

W. L. G. J.

Guide to Geographical Books and Appliances. The Second Edition of "Hints to Teachers and Students on the Choice of Geographical Books for Reference and Reading." By H. R. Mill, LL.D., D.Sc., Revised by A. J. Herbertson, J. F. Unstead and Nora E. Macmunn. viii and 207 pp., Published for the Geographical Association by George Philip & Son, Ltd., London, 1910. 5s. 8½ x 5½.

Dr. Mill presented all his rights in his well-known book "Hints to Teachers" to the Geographical Association (Great Britain) on condition that a new edition be produced. This condition has been fulfilled by the preparation and publication of the present work. The plan and most of the contents of the earlier work are reproduced, but the number of works recorded is much longer than in the original book. The object of the volume, as Dr. Mill said in the first edition, "is to place before teachers and students a selection of the best available books on geography as an educational subject, and on different parts of the world." This purpose is admirably carried out and extended in the new edition. While not wholly complete the list is a good teachers' and students' guide to most of

the best books on geography, for reading, study or reference, in English, German and French. There are, however, a number of inaccuracies which should be corrected in the next reprinting.

The Dangers of Municipal Trading. By Robert P. Porter. xiii and 320 pp and index. George Routledge & Sons, Ltd., London, 1907. $7\frac{1}{2} \times 5$.

The book contains the substance of many lectures and addresses delivered by the author before various bodies in England. The facts he gives illustrate the dangers of state or municipal interference with industrial development and the unwisdom of usurpation by public authorities of functions which are better left to private companies and to individual enterprise. The larger part of his data was collected in Great Britain.

Die Indogermanen. (Wissenschaft und Bildung. Einzeldarstellungen aus allen Gebieten des Wissens. Herausgegeben von Privatdozent Dr. Paul Herre). Von Dr. phil. O. Schrader. 165 pp. and illustrations. Verlag von Quelle & Meyer, Leipzig, 1911. Mk. 1.25 7×5 .

This highly valuable volume, interestingly dealt with throughout, is a revision to a type of twenty years ago. At that time English students lent their aid to a series of primers of science topics. The defect in the method was that the method of treatment was far too jejune for the needs of specialists trained in each particular subject, and equally far too rich for the use of beginners. The unfortunate result was that students of a not infrequent type studied the primer and not the science, thereby were they able to pass examinations with flying colors and qualify to their own complete satisfaction as leaders of thought without training in the capacity of thinking, with deplorable results which have not yet wholly worn off.

As a primer this small volume is free from the mechanical defect of the earlier type. Of necessity it has been subjected to great condensation, yet it is easy reading and wholly free from the catechetical manner. The moot points are very clearly stated with judicial balance in presentation. It may safely be put in the hands of junior students, always under the inspiration of competent teachers; to more advanced students it will fill an important position as a syllabus of the most recent opinions upon the Aryan family, its language, social complex, life and migration. For the general reader, of course interested in the backward view of his ancestry but scantily tolerant of the arduous detail of special investigation, this volume supplies an excellent conspectus of the most modern views. How fresh and modern it is may be seen from the brief but well-balanced bibliography or short index of collateral reading; with the exceptions of Schrader's *Handelsgeschichte* (1886) and Delbrück's *Verwandtschaftnamen* (1889), not one of the authorities cited is more than fifteen years old.

WILLIAM CHURCHILL.

Eastern Asia. A History. By Ian C. Hannah, M.A. 327 pp., appendices and index. Frederick A. Stokes Company, New York, 1911. \$2.50. $9 \times 5\frac{1}{2}$.

This work is history only in the sense that the monkish chronicles of Europe are history. To compress into a score of chapters the events of three-quarters of that continent where history began and grew old before our race had emerged into the lowest and immemorial barbarism is impossible from the start. The result in this volume partakes rather of the nature of the "quiz" or ready com-

pend whereby matters are made easy for such as find their highest education in passing examinations. We may instance the great figure of Tamerlane, who receives four pages in this narrative. There are dates, some names of places, and that is the sum for one of the great names of history. Taking this work as a mere compend, its value would have been largely increased by footnotes or a bibliography whereby the student might be directed to sources from which he could derive more detailed information.

Our estimate of the purpose of this work as a feeder to examinations is confirmed by the author's preface, in which he sets forth that in the ten years which have elapsed since the first edition much lecturing on the subject for university extension has given him, he trusts, a better grip of the subject. Dealing with peripheral phenomena, for it is only on the edges of his eastern Asia that history has been preserved in dated records, he is forced to pursue several threads, each for a certain space and then to wait until the other threads are drawn out to equal length before he can resume each earlier thread. The result is the appearance of lack of continuity. Yet here, as wherever men live, history is continuous, it has continued here longer from the remote past than elsewhere on the world. A great change of direction marks the modern from the former epochs of Asian history. The newer impulse to the history of the great home continent is centripetal; Europe comes to Asia by water and from the shore seeks the inner empires. But the ancient impulse was centrifugal; from the inner deserts ever swarmed fresh hordes of brute barbarians seeking with destructive avidity to enjoy the delights of culture. When we write European history the beginning of the present is in a past ravaged by the Goth and the Varangian, and beginning with them we obtain a consistent picture. Whether compend or history, the story of eastern Asia, likewise, must be written from within outward if we are at all to have a connected narrative. This work will have its field of usefulness; from its index the inquirer will find it easy to discover such memorable facts concerning the larger figures of Asiatic life as will satisfy most inquiry.

WILLIAM CHURCHILL.

The Book of the English Oak. By Charles Hurst. 196 pp., map, 14 illustrations and index. Lynwood & Co., Ltd., London, 1911. 5d. 7½ x 5.

The author has found much of interest to say about the English oak. It would scarcely be expected that a whole book could be filled with the oak tree; but the oak has many moods, conditions and aspects, and the author has found many sides of it to tell about. He treats its traditions, its place in poetry and shows how every Englishman may enrich his country by cultivating the oak and thus perpetuating one of the most characteristic features of the English landscape.

Coral and Atolls. Their History, Description, Theories of Their Origin both Before and Since that of Darwin, the Influence of Winds, Tides and Ocean Currents on Their Formation and Transformations, Their Present Conditions, Products, Fauna and Flora. By F. Wood-Jones, B.Sc. xxiii and 392 pp., map, illustrations, bibliography, appendices and index. Lovell, Reeve & Co., Ltd., London, 1910. 24s. 9 x 6½.

The title conceals the fact that this volume contains a most interesting account of the kings of Cocos-Keeling, a topic that cannot fail of attracting attention. The adventure side of geography has had its great share in the upbuild-

ing of the science. There has never been lack of brave men who have gone to the edge of things to carve out kingdoms for themselves. In these waters of the Indo-Pacific three come readily to mind: Greig of Fanning Island, Brooke of Sarawak, Clunies-Ross of Cocos. It is but among the yesterdays that Greig sold Fanning to a commercial company and relinquished a dream which, after all, is mediæval in its conception. Sarawak under the second of the Brookes has fallen into place as one of the sovereign lands of the earth. Yet older is the kingdom of Cocos-Keeling, for the third Ross now wields the kindly authority of his ancestors. It is a fine tale of brave deeds, a pity that there is no word to show that this is in the contents of the book.

Cocos possesses singular interest for every student of the contribution of the corals to land formation. It is the type specimen which underlies all of Darwin's theory of subsidence, the only atoll which he ever had the opportunity to examine. But Darwin knew Cocos for only ten days and sailed away; Dr. Wood-Jones spent fifteen months in the daily study of the growth of Cocos through the accretion and destruction of its corals.

He begins his series of valuable studies by an examination of the life history of the minute unit, the zoöid, which is the agent in this great structural geography. At the outset he renders a great service by his proof that the nomenclature of the corals is wholly misleading, because the systematic biologists have been misled by differences in the stony remains found in museum cabinets which are not characteristic of specific differences. He is very careful to point out that the zoöid is peculiarly susceptible to the external influences of its habitat, both in the individual coral colony and in the lagoon or outer reef conditions in which it must live. He avers, and it carries conviction, that the variety in the stony remnant of that which was once alive records conditions of environment, not such structural difference as may serve for the foundation of species. His observations tend to strengthen the genera under observation, to show how needlessly and how improperly the synonymy is overloaded with untenable species.

In his study of the individual zoöid he introduces that factor which he develops more and more into the explanation of reef formation, the effect of sedimentation. In the story of the zoöid he makes it clear that it is the heaping up of a few grains of sand upon the soft tissues which kills the animal. Passing to the next higher unit he carries along to each of the important genera of lagoon and reef corals the study of the effect of this depositing of foreign material. He has made such excellent use of the *Porites* that we may follow his discussion along toward the valuable conclusions at which he addresses it. The colony of *Porites* tends to form a spherical mass not at first attached to the base upon which it grows or by no more than a pedicel. As the colony increases by growth the lower zoöids have to bear the weight of the superincumbent mass and are at the same time suffocated by being forced down upon the sand or rock on which they rest. The death of these individuals tends toward the deformation of the colony toward the dome, or half-sphere, shape. The summit zoöids are equally imperilled by the conditions of their life, the silt carried by the water is deposited on the colony, on the sloping edges it is cleared by the activity of the zoöid, falls by gravity or is scoured by the water movement. But on the summit of the dome the sediment remains, the zoöids die and deformation follows. In the end the classic type of the *Porites* colony reproduces the type of the atoll, as that is a miniature of the completed atoll.

The theory is most ingeniously elaborated. The author discusses the warring theories as point by point they arise for consideration; but it is rather discussion *ex laguna* than discussion *ex cathedra*. Does a point need attention, he takes us at once to the waters and shows us just what processes of nature are now operative. It is a most attractive method and should lead to a better comprehension of this great factor in land formation. **WILLIAM CHURCHILL.**

Im Ballon über die Jungfrau nach Italien. Naturaufnahmen aus dem Freiballon. Von Gebhard A. Guyer. Mit einem Anhang, Himmelfahrt traversierung der Alpen im Ballon "Cognac" von Konrad Falke. 45 pp., map and illustrations. Gustav Braunbeck & Gutenberg—Druckerei Aktiengesellschaft, Berlin, 1910. 10 x 7.

A series of forty-eight engravings of photographs taken in the upper air from a balloon above the Alps. Most of them are fine specimens of photography, with wonderful cloud effects, showing the aspects of the upper parts of the mountains with névé fields above which the peaks arise. A brief description of each view is given. The book concludes with the story of Mr. Falke's air journey across the Alps.

Le Grandi Comunicazioni, di Terra e di Mare. By Capt. Luigi Giannitrapani. vi and 214 pp., maps, appendices and index. Nicola Zanichelli, Bologna, 1911. 6½ x 4½.

An excellent study of modern means of communication by land and sea in all parts of the world. The treatment in so small a volume is necessarily condensed, but the essentials are given. The work is illustrated by three maps well produced by the Istituto Geografico de Agostini-Novara.

How to Use Contour Handmaps for Class Teaching. Suggestions for Practical Exercises with Coloured Facsimile. By J. A. White. 8 pp. and maps. George Philip & Son, Ltd., London, 1911. 6d. 8½ x 5½.

The purpose is to show how contoured hand maps may be used to acquire a sound knowledge of the geography of a region in a series of class-room exercises. A contour map of Scotland is employed to illustrate some phases of the method advocated.

Historia de las Guerras Civiles del Perú (1544-1548), y de Otros Sucesos de las Indias. Por Pedro Gutiérrez de Santa Clara. Tomo Cuarto. 571 pp. and index. Librería General de Victoriano Suárez, Madrid, 1910. 10s. 6d. 8 x 5.

This fourth volume of the historical chronicle, the first three volumes of which have already been reviewed in the *Bulletin*, does not call for any extended mention. It is a pure chronicle of events, highly important for an intimate knowledge of the troubled time immediately preceding the complete restoration of royal authority in Perú by Pedro de la Gasca. For so-called political geography it affords interest through the mention of places, water-courses and the like, as any other chronicle would, but there is less descriptive geography in it than in the preceding volumes. There is much analogy with the third part of Cieza de Leon, as far as the latter is known.

AD. F. BANDELIER.

The Inquisition in the Spanish Dependencies. Sicily-Naples-Sardinia-Milan-The Canaries-Mexico-Peru-New Granada. By Henry Charles Lea, LL.D., S.T.D. xvi and 564 pp. and index. The Macmillan Co., New York, 1908. \$2.25. 9 x 6½.

A comparatively brief sketch of a lengthy and complicated question, based largely upon the material furnished by José Toribio Medina, a highly respectable fountain of knowledge. A critical review of the book lies entirely outside the scope of this *Bulletin*. The work has attracted deserved attention and has, therefore, been abundantly reviewed.

Ad. F. BANDELIER.

Imperial Telegraphic Communication. By Charles Bright, F.R.S.E. xxiv and 212 pp., map and index. P. S. King & Son, London, 1911. 7½ x 5.

Treats of the development of the telegraph and cable service in the British Empire and is in some sort a history of the movement for extended and cheaper telegraphy. The appendix gives a table of charges for foreign and colonial telegrams from any part of the United Kingdom.

Plant-Animals. Study in Symbiosis. By Frederick Keeble, Sc.D. viii and 163 pp., illustrations, bibliography and Index. University Press, Cambridge, 1910. 40 cents. 6½ x 5.

This is one of the "Cambridge Manuals of Science and Literature." While Dr. Keeble was working in a small marine laboratory in Brittany, visitors often asked him to explain his purposes in going to and fro along the shore, wading among the sea weeds "and bringing into the laboratory minute, worm-like, animals which represented often my sole catch." Many of the visitors became interested in the work and the numerous questions they asked suggested this little volume. He has written it *con amore*, tells of many striking phenomena and few readers can fail to be interested in these pages.

La Haute-Loire et le Haut-Vivarais. Guide du Touriste, du Naturaliste et de l'Archéologue. Par Marcellin Boule. viii and 366 pp., map, illustrations and index. Masson et Cie, Paris, 1911. Fr. 450. 7 x 4½.

This volume completes the small series by Mr. Boule on the central volcanic massif of France. All intelligent persons visiting the regions described will find that the large variety of information presented will add much to the pleasure and the profit of their journey.

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NEW MAPS

EDITED BY THE ASSISTANT EDITOR

System Followed in Listing Maps.

Title. As on original, if possible. If lacking or incomplete, necessary matter enclosed in brackets.

Scale. Natural (unless otherwise than original), followed by equivalent in miles to one inch. If no scale on original, approximate scale enclosed in brackets.

Coordinates. Approximate limiting coordinates of map given. Where map-net lacking, coordinates, if possible of determination, given in brackets. All meridians referred to Greenwich. If map not oriented N., orientation given.

Colors. Number of tints of separate symbols, not number of color printings given. Black or basal color not considered a color.

Source. If map separately published, name of institution issuing it, place and date given. If a supplement, title of paper or book, author, periodical, volume, pages and year given.

Comment. Descriptive and critical. In brackets.

Regional Classification. Major political divisions of the unit, as a rule, except for United States and Canada. Boundaries of continents according to Siever's *Länderkunde*, Kleine Ausgabe.

MAPS ISSUED BY UNITED STATES GOVERNMENT BUREAUS

U. S. GEOLOGICAL SURVEY

Maps Accompanying Publications

ALASKA. Map Showing Relation of Alaska Coal Fields to Transportation Routes. [1:11,200,000 approx. (1 in.=176.8 miles approx.)]. 75° - 52° N.; 178° - 126° W. Accompanies, as Pl. I, facing p. 52, "Alaska Coal and Its Utilization" by A. H. Brooks, *Bull. 442-J* (extract from *Bull. 442*), 1911.

[Valuable map showing areas known to contain workable coals and coal-bearing rocks; location of mountain axes, rivers navigable in summer and limits of sea ice in winter. For similar delineation of mountain axes see map facing p. 178, *Bull. Amer. Geogr. Soc.*, Vol. 42, 1910.]

COLORADO. (a) Map showing approximate distribution of the principal silver, lead and gold regions in Colorado. After Spurr. [1:3,350,000 approx. (1 in.=52.9 miles approx.)]. 41° - 37° N.; 109° 1/2° - 101° 1/2° W.

(b) Outline Map of the Region Adjacent to Breckenridge, Colo. 1:250,000 (1 in.=3.95 miles). [39°42' - 39°55' N.; 106°22' - 105°41' W.]

(c) Geologic Map of the Breckenridge District, Colorado. Geology by F. L. Ransome and E. S. Bassin. Surveyed in 1909-11. 1:24,000 (1 in.=0.38 mile). 39°33' - 39°27' N.; 106°4' - 105°56.8' W. 25 colors.

(d) Map Showing Topography and Mining Claims in the Breckenridge District, Colorado. Surveyed in 1908. Contour interval 50 ft. Same scale and coordinates as map (c). 3 colors.

Accompany, as Fig. 1 on p. 14, Pl. III facing p. 16 and Pls. I and II in pocket, "Geology and Ore Deposits of the Breckenridge District, Colorado" by F. L. Ransome, *Prof. Paper* 75, 1911.

NEW MEXICO. (a) Map showing location of Estancia, Encino and Pinos Wells basins. [1:4,000,000 approx. (1 in.=63.1 miles approx.)]. 35°25' - 33°30' N.; 107° - 102°50' W.

(b) Map of Estancia Valley, New Mexico, Showing Physiography and Pleistocene and Recent Geology. 1:375,000 (1 in.=50.8 miles). [35°25' - 34°20' N.; 106°30' - 105°40' W.]. 5 colors.

(c) Map of Estancia Valley, New Mexico, Showing Depth to and Quality of the Ground Waters. Same scale and coordinates as map (b). 6 colors.

(d) Reconnaissance Geologic Map of the Ancient Lake Bed in the Encino Basin, New Mexico. 1 in.=1/2 miles (105,040). [34°40' N.; 105°25' W.]. With geologic section. 6 colors.

Accompany, as Fig. 1 on p. 7, Pl. I facing p. 7, Pl. XI facing p. 38 and Pl. XII facing p. 76, "Geology and Water Resources of Estancia Valley, New Mexico, etc." by O. E. Meinzer, *Water-Supply Paper* 275, 1911.

VIRGINIA. Map Showing Economic Geology of Richmond, Va., and Vicinity. By N. H. Darton. 1:62,500 (1 in.=0.99 mile). 37°37' - 37°28.6' N.; 77°32' - 77°21' W. 8 colors. With geological section. Accompany, as Pl. I facing p. 6, "Economic Geology of Richmond, Virginia, and Vicinity" by N. H. Darton, *Bull.* 483, 1911.

NORTH AMERICA

ALASKA. Physical Map of Alaska. [1:12,200,000 approx. (1 in.=192.6 miles approx.)]. No map-net. 12 colors. Accompany, as separate plate facing p. 36, "The Ice Age in North America" (5th edition) by G. F. Wright, Oberlin, O., 1911.

[Land relief expressed in five tints and mountain hachuring, the latter primitive. Orthography of names obsolete].

CANADA AND UNITED STATES. Map Showing, in Dotted Lines, the Pre-glacial Drainage in the Basin of the Lower Great Lakes. Corrected, according to the latest information, by Professor J. W. Spencer. [1:4,000,000 approx. (1 in.=63.1 miles approx.)]. [49° - 41° N.; 85°1/2' - 76° W.]. Accompany, as separate plate facing p. 32, "The Ice Age in North America" (5th edition) by G. F. Wright, Oberlin, O., 1911.

CANADA AND UNITED STATES. Map of the Glacial Lake Agassiz showing its relation to Hudson Bay and the Great Lakes. By Warren Upham, D. Sc. [1:14,200,000 approx. (1 in.=224.2 miles approx.)]. 58° - 44° N.; 114° - 76° W. Accompany, as separate plate facing p. 401, "The Ice Age in North America" (5th edition) by G. F. Wright, Oberlin, O., 1911.

NORTH AMERICA. Map of North America showing interlapping late Black River and early Trenton Invasions from the Arctic, Atlantic, Gulf of Mexico and Pacific Sides. [1:70,000,000 approx. (1 in.=1105 miles approx.)]. No map-net. Accompany, as Fig. 7 on p. 368, "Revision of the Paleozoic Systems" by E. G. Ulrich, *Bull. Geol. Soc. Amer.*, Vol. 22, pp. 287-680, 1911.

UNITED STATES AND CANADA. Map Showing the Glacial Geology of the United States and Canada. [1:22,000,000 approx. (1 in.=347.3 miles approx.)]. 54° - 25° N.; 130° - 65° W. Accompany, as separate plate facing p. 202, "The Ice Age in North America" (5th edition) by G. F. Wright, Oberlin, O., 1911.

[Shows southern limit of ice-sheet and drift, terminal moraines, courses of glacial striae, mountain areas of local glaciation, Driftless Area of Wisconsin, modified drift in valleys of southward drainage from the ice-sheet, boundaries of glacial lakes.]

UNITED STATES

CONNECTICUT. Preliminary Geological Map of Connecticut by H. E. Gregory and H. H. Robinson. 1906. 1:25,000 (1 in.=39.45 miles). 41 colors. Accompany pamphlet with same title by same authors, *Bull.* No. 7, Connecticut Geological and Natural History Survey, 1907.

[The standard general geological map of the state.]

EASTERN UNITED STATES. (a) Map of the Southern Appalachian Valley Showing Outcrops of Ordovician Rocks. [1:2,000,000 (1 in.=31.6 miles approx.)]. Oriented N. 36° E. 38° - 34° N.; 85°30' - 80°15' W.

(b) Sketch Map of southeastern North America Showing Appalachian troughs and principal lines along which stratigraphic overlaps are common. [1:28,500,000 approx. (1 in.=450.6 miles approx.)]. 53° - 28° N.; 102° - 55° W.

Accompany, as Pl. 25 (frontisp.) and as Fig. 1 on p. 293, "Revision of the Paleozoic Systems" by E. O. Ulrich, *Bull. Geol. Soc. Amer.*, Vol. 22, pp. 287-680, 1911.

FLORIDA. Geologic Map of North-Central Part of Florida Suggesting oscillation of the Ocala dome. From map published by Florida State Geological Survey, 1909. [1:2,200,000 (1 in.=34.7 miles approx.)]. Scale incorrectly given as 1:1,000,000. 30°35' - 27°25' N.; 83°5' - 81°5' W. Accompany, as Fig. 13, on p. 431, "Revision of the Paleozoic Systems" by E. O. Ulrich, *Bull. Geol. Soc. Amer.*, Vol. 22, pp. 287-680, 1911.

MAINE. The kames of Maine and southeastern New Hampshire. [1:4,200,000 approx. (1 in.=66.3 miles approx.)]. 147° - 42°30' N.; 71°30' - 67° W. Accompany, as Fig. 104 on p. 344, "The Ice Age in North America" (5th edition) by G. F. Wright, Oberlin, O., 1911.

MINNESOTA. Map showing the stages of recession of the ice in Minnesota. (Upahm). [1:6,200,000 approx. (1 in.=97.0 miles approx.)]. 49° - 43°1/2' N.; 92° - 90° W. Accompany, as Fig. 181 on p. 662, "The Ice Age in North America" (5th edition) by G. F. Wright, Oberlin, O., 1911.

NEW YORK. Map of western New York, showing distribution of morainal deposits. (From U. S. Geological Survey). [1:3,000,000 approx. (1 in.=56.8 miles approx.)]. 43°30' - 41°20' N.; 80° - 75° W. Accompany, as Fig. 65 on p. 206, "The Ice Age in North America" (5th edition) by G. F. Wright, Oberlin, O., 1911.

NEW YORK. Free Public Educational Institutions of the City of New York in the Year 1911. Prepared by the Department of Public Education of the American Museum of Natural History. [1:54,000 approx. (1 in. = 0.85 miles approx.)]. Oriented N. 30° W. [$40^{\circ}55' - 40^{\circ}33' N.$; $74^{\circ}12' - 72^{\circ}45' W.$]. 5 colors.

[Shows location of museums, public schools, high schools, corporate schools, public libraries and lines of transportation].

NORTH AND SOUTH DAKOTA. Sketch Map of the Missouri Coteau and its Moraines. By J. E. Todd, Asst. Geologist, U. S. G. S. [1:4,000,000 approx. (1 in. = 63.1 miles approx.)]. $48\frac{1}{2}^{\circ} - 49\frac{1}{2}^{\circ} N.$; $102\frac{1}{2}^{\circ} - 97^{\circ} W.$ Accompanies, as Fig. 67 on p. 216, "The Ice Age in North America" (5th edition) by G. F. Wright, Oberlin, O., 1911.

UNITED STATES. [Two maps:] U. S. A. Census of 1900. (a) Map showing the increase per cent of the population of each State between 1890 and 1900. (b) Map showing the increase per cent of the population of each State between 1900 and 1910. [1:50,000,000, or 1 in. = 280.13 miles. Accompany, on p. 403, "Some Recent Census Returns" (first part) by O. J. R. Howarth, *Geogr. Journ.*, Vol. 38, pp. 396-404, 1911.

CANADA

BRITISH COLUMBIA. [Map of Vancouver Island]. [1:2,000,000 approx. (1 in. = 34.7 miles approx.)]. On back cover of "Vancouver Island . . . A History of its Resources by Districts" compiled by The Vancouver Island Development League, Victoria, B. C.

[Shows railroads and ferries in existence, those authorized or under construction and those contemplated. Gives ocean distances from Victoria to principal ports of the world.]

CANADA. Resource Map of the Dominion of Canada. 1911. 1:12,500,000, or 197.3 miles to 1 inch. $73^{\circ} - 40^{\circ} N.$; $150^{\circ} - 35^{\circ} W.$ 5 colors. Accompanies "Statistics of the Dominion of Canada," Dept. of the Interior, Ottawa, 1911.

[Indicates location of principal raw products by their names printed in red. Coal fields and collieries shown.]

CANADA. Index map to Sheets of 1 Inch to 1 Mile & $\frac{1}{2}$ Inch to 1 Mile Maps of Canada Published by Department of Militia and Defence. Geographical Section, General Staff, No. 2278. Index Map No. 12. Revised to Jan'y, 1911. [1 in. = 40 miles (1:2,534,400)]. $47\frac{1}{2}^{\circ} - 41\frac{1}{2}^{\circ} N.$; $83^{\circ} - 70^{\circ} W.$ 6 colors.

[Shows areas surveyed and sheets published. The regions so far covered by this survey are the southern half of the Interlake Peninsula of Ontario and the St. Lawrence Lowland from Ottawa and Kingston to below Montreal. These maps are very similar in quality to the topographic sheets of the U. S. G. S. and superior to them in that woods are represented on all sheets. The price of the sheets 1:63,360 is 50 cents, that of the sheets 1:26,720, 60 cents apiece.]

SOUTH AMERICA

ARGENTINA-CHILE. Demarcación de Límites con Chile. 6a Sub-Comisión. Región de la Puna. Mapa Preliminar. Z. Sánchez. T. Loos. Julio de 1898. [1:200,000 (1 in. = 3.16 miles). $24^{\circ}40' - 27^{\circ}27' S.$; $66^{\circ}20' - 67^{\circ}10' W.$ Accompanies, facing p. 102, "Frontera Argentino Chileno. Informe del Jefe de la 6a Sub-Comisión de Límites con Chile. 1898. Informe No. 15. (Conclusión)," *Bol. Inst. Geogr. Argentino*, Vol. 25, pp. 82-103, 1911.

[Valuable large-scale map embracing the intermonte plateau of the Puna de Atacama. Sketch contours.]

BRAZIL. (a) A Portion of Brazil showing relative position of Diamond fields. Reproduced from "Journal of the Royal Society of Arts," with additions by David Draper. [1:21,000,000 approx. (1 in. = 173.6 miles approx.)]. $11^{\circ} - 19^{\circ} S.$; $58^{\circ} - 48^{\circ} W.$

(b) [Geomorphologic] Map of Bagagem Valley. No scale. [$19^{\circ} S.$ and $48^{\circ} W.$].

Accompany, as Pls. III and IV, "The Diamond-Bearing Deposits of Bagagem and Agua Suja in the State of Minas Geraes, Brazil" by D. Draper, *Trans. Geol. Soc. South Africa*, Vol. 14, pp. 8-19, 1911.

BRAZIL. Planta do Litoral de S. Sebastião e do Rio Juquiriqueré. 1:50,000 (1 in. = 0.79 mile). $23^{\circ}37' - 23^{\circ}48' S.$; $45^{\circ}40' - 45^{\circ}10' W.$ 2 colors. Accompanies "Exploração do Rio Juquiryqueré [sic]," *Comm. Geogr. e Geol. do Estado de S. Paulo*, 1911.

[One of the excellent exploratory surveys along river courses which is covering the state of São Paulo with a net-work of surveyed lines.]

COLOMBIA. Península de la Guajira [Guajira] por F. A. A. Simons. [1 in. = 15 miles (1:950,400)]. $12^{\circ}30' - 10^{\circ}46' N.$; $73^{\circ} - 77^{\circ} W.$ 1 color. Accompanies, facing p. 404, "Los Indios Guajiros" (first part), translated from the English of F. A. A. Simons by A. Ernst, *Rev. Técn. Minist. Obr. (Caracas, Venezuela)*, Vol. 1, pp. 403-408, 1911.

[Taken from a report on an exploration made for the Colombian Government in 1883-84, published in the *Anales de la Instrucción Pública de Colombia*.]

VENEZUELA. Croquis de los caminos de recuas entre Santa Lucía, Caucagua y Guatire. 1:150,000 (1 in. = 3.37 miles). [$10^{\circ}30' - 10^{\circ}10' N.$; $65^{\circ}50' - 66^{\circ}25' W.$]. Accompanies, facing p. 392, report on "Caminos entre Boca de Siquire, Caucagua y Guatire" by M. L. Quintero, *Rev. Técn. Minist. Obr. Publ. (Caracas)*, Vol. 1, pp. 390-393, 1911.

AFRICA

CENTRAL AFRICA. Route of the Expedition of the Duke of Mecklenburg, 1907-08] 1:7,500,000 (1 in. = 118.37 miles). $6^{\circ} N. - 6^{\circ} S.$; $12^{\circ} - 42^{\circ} E.$ 2 colors. Accompanies "In the Heart of Africa" by Duke Adolphus Frederick of Mecklenburg, London, New York, etc., 1910.

EASTERN SAHARA. Sahara Orientale. [1:24,400,000 approx. (1 in. = 385.1 miles approx.)]. [$38^{\circ} - 7^{\circ} N.$; $6^{\circ} - 36^{\circ} E.$]. Accompanies, on p. 323, "Les Turcs en Afrique Centrale: La Frontière Franco-Tripolitaine" by M. Cortier, *L'Afrique Franç.*, Vol. 21, pp. 320-328, 1911.

[Shows Franco-Tripolitan boundary, caravan routes and uninhabitable deserts.]

FRANCHE GUINEA. (a) Schéma des Sources du Niger et du pays Toma. [1:9,900,000 approx. (1 in. = 142.0 miles approx.)]. [$13^{\circ}25' - 7^{\circ} N.$; $12^{\circ} - 5^{\circ} W.$].

(b) Projet de délimitation en 1906 [between French Guinea and Liberia]. [1:7,100,000 approx. (1 in. = 112.1 miles approx.)]. [$9^{\circ} - 7^{\circ} N.$; $11^{\circ} - 8\frac{1}{2}^{\circ} W.$].

(c) *Carte du Pays Toma.* Dressée d'après les travaux de M. le Lieut'. Bouet, des Officiers du Service Milit're et de la Mission de Délimitation. [1:950,000 approx. (1 in.=15.0 miles approx.)]. 9° 58' - 7° 30' N.; 9° 55' - 8° 40' W.

(d) *Frontière Franco-Libérienne.* [1:6,800,000 approx. (1 in.=107.3 miles approx.)]. 9° 50' - 6° 30' W.

Accompany, on pp. 187, 188, 189 and 191, "Les Tomas" (first part) by F. Bouet, *Rens. Colon.*, No. 8, pp. 185-200, 1911.

[Map (c) a valuable map on a relatively large scale embodying original material.]

GERMAN AND BRITISH EAST AFRICA. Allgemeine Übersichtskarte der Wohngebiete des Massai-Volkes. 1:3,000,000 (1 in.=47.34 miles). 2° 30' N. - 6° 30' S.; 33° 30' - 40° 30' E. 3 colors. Accompanied "Die Massai" by M. Merker, Berlin, 1910.

[Shows extent of steppes lands and approximate boundaries of Massai provinces.]

GERMAN AND BRITISH EAST AFRICA-BELGIAN CONGO. The [Duke of Mecklenburg's] Expedition's field of work. Prepared by Lieut. M. Weiss, 1:20,000 (1 in.=31.56 miles). 2° N. - 6° S.; 24° - 32° E. With inset: The Volcanic district. 1:600,000 (1 in.=9.46 miles). 1° 10' - 1° 30' S.; 20° 30' - 20° 50' E. 3 colors. Accompanied "In the Heart of Africa" by Duke Adolphus Frederick of Mecklenburg, London, New York, etc., 1910.

[Valuable original material on the region drained by the Kagera source of the Nile and the volcanic region N.E. of Lake Kivu.]

GERMAN EAST AFRICA. (a) Skizze von Daressalam mit den in den Jahren 1901-05 von Brandes, Koert, und Tornau ausgeführten Bohrungen. 1:20,000 (1 in.=0.32 mile). [6° 30' S. and 39° 15' E.]. (b) Skizze von Tanga mit den von Koert 1902-03 ausgeführten Wasserbohrungen. 1:15,000 (1 in.=0.24 mile). [5° 5' S. and 39° 10' E.].

Accompany, as Taf. 1 and Taf. 3, "Zur Geologie und Hydrologie von Daressalam und Tanga (Deutsch-Ostafrika)" by W. Koert and F. Tornau, *Abhandl. königl. Preussischen Geol. Landesanstalt*, Neue Folge, Heft 3, Berlin, 1910.

GERMAN SOUTH-WEST AFRICA. Farm-Übersichtskarte von dem Bezirk Gibeon und dem Distrikt Maltahöhe. Bearbeitet und gezeichnet im Bureau der kaiserlichen Landesvermessung in Windhuk durch den Topograph Karsunko. Nov. 1910. In 2 sheets. 1:200,000 (1 in.=3.16 miles). 23° 37' - 25° 50' S.; 15° 53' - 18° 20' E. 3 colors. Accompanied, as Taf. 6, *Mitt. aus den Deutschen Schutzgeb.*, Vol. 24, No. 3, 1911.

[Excellent large-scale map showing generalized contours in brown, drainage in blue, farm boundaries in green.]

KAMERUN. Karte zu: Mann, Stand der geologischen Erforschung des Schutzgebietes Kamerun. 1:5,000,000 (1 in.=78.91 miles). 13° - 15° 30' N.; 6° 30' - 17° 30' E. 1 color. With two insets: (1) Buca und Umgegend. 1:25,000,000 (1 in.=30.45 miles). 4° 50' - 5° 5' N.; 8° 27' - 10° 20' E. (2) [Map of Baden on same scale as main map for comparison]. Accompanied "Bericht über den Stand der geologischen Erforschung von Kamerun im Mai 1910" by O. Mann, *Mitt. aus den Deutschen Schutzgeb.*, Vol. 24, pp. 203-218, 1911.

[Shows, in red, Dr. Mann's route and the location of mineral deposits.]

RHODESIA. Sketch Map of the South-East corner of the Bangweulu Swamps inhabited by the Wa-Unga showing the channels connecting the Chambeshi and Luapula Rivers as traced during twelve journeys by boat and canoe, 1902-1910. By H. Melland. 1:500,000, or 1 in.=78.9 miles. 11° 0' - 12° 2' S.; 20° 15' - 31° 15' E. 1 color. With inset, 1:25,000,000, showing general location of main map. Accompanied "Bangweulu Swamps and the Wa-Unga" by F. H. Melland, *Geogr. Journ.*, Vol. 38, pp. 381-395, 1911.

[Valuable original map.]

SUDAN. Schéma du Massalit et itinéraires de la Compagnie Arnaud d'après les levés des lieutenants Delacomme, Théral, Jourdy, Béraud, etc. [1:30,000 approx. (1 in.=14.7 miles approx.)]. [14° 15' - 15° N.; 21° - 23° E.]. With inset map showing general location. Accompanied, on p. 281, "Données Géologiques sur le Ouadai et les Pays Limítrophes" by P. Lemoine, *L'Afrique Franç.*, Vol. 21, pp. 280-283, 1911.

TRANSVAAL. Sketch Map showing the approximate positions of the Kimberlite occurrences in the Pretoria District. [1 in.=4 miles (1:253,440). Scale incorrectly given.]. [24° 27' - 24° 55' S.; 28° 15' - 28° 43' E.]. Accompanied, as Fig. 1 on p. 44, "Petrographical Notes on the Kimberlite Occurrences in the Pretoria District" by P. A. Wagner, *Trans. Geol. Soc. South Africa*, Vol. 14, pp. 43-63, 1911.

TRANSVAAL. [Geological Map of a portion of the Lower Witwatersrand System on the Central Rand.]. [1:60,000 approx. (1 in.=0.05 mile approx.)]. [26° 15' S. and 38° E.]. Accompanied, as Pl. X, "Some Structural Features of the Witwatersrand System on the Central Rand, with a Note on the Rietfontein Series" by E. T. Mellor, *Trans. Geol. Soc. South Africa*, Vol. 14, pp. 24-42, 1911.

WESTERN AFRICA. Le Chemin de Fer de Guinée et ses Rapports Économiques avec le Cours du Niger. [1:21,300,000 approx. (1 in.=336.2 miles approx.)]. 21° - 3° N.; 18° W. - 13° E. Accompanied note with similar title, *Tour du Monde*, Vol. 17, pp. 253-254, 1911.

ASIA

CEYLON. [Map of] Ceylon. [1:1,000,000 approx. (1 in.=15.8 miles approx.)]. 10° - 5° 30' S.; 79° 15' - 82° E. Accompanied, in pocket, "The Veddas" by C. G. and B. Z. Seligman, Cambridge (England), 1911.

[Nomenclature especially full in Vedda country of east-central Ceylon.]

FRENCH INDO-CHINA. (a) Indochine Française. Carte Physique. 1:6,000,000 (1 in.=94.69 miles). 23° 30' - 8° N.; 100° - 110° E. 5 colors.

(b) Indochine Française. Carte Économique et Administrative. Same scale and coordinates as map (a). 2 colors.

(c) Cochinchine [Carte Physique]. 1:2,500,000 (1 in.=39.45 miles). 12° 10' - 8° 30' N.; 103° 10' - 107° 55' E. 5 colors.

(d) Tonkin [Carte Physique]. 1:2,500,000. [23° 35' - 19° 40' N.; 101° 55' - 108° 20' E. 6 colors.

Accompany, as Planches I-IV, "L'Indo-Chine française" by H. Russier and H. Brenier, Paris, 1911.

[Maps (a), (c) and (d) are good general physical maps showing relief in four or five tints, ranging from green through yellow to brown. Map (b) shows distribution of products, railroads and navigable rivers.]

INDIA. Kashmir. Sketch Maps to illustrate the explorations of Dr. A. Neve in the Himalayas, 1896-1910. 1:250,000, or 1 in. = 3.94 miles. 3 colors. No. I. 34° 28' - 33° 50' N.; 75° 42' - 76° 13' E. No. II. 35° 0' - 34° 46' N.; 77° 27' - 77° 49' E.

With two insets: (1) [Map of Kashmir showing Dr. A. Neve's route and location of maps Nos. I and II]. 1:2,000,000, or 1 in. = 31.56 miles. 36° 3' 30" - 33° 2' 5" N.; 75° 2' - 78° 2' 5" E. 2 colors. (2) [Map of northern India showing general location of maps I and II]. 1:30,000,000 (1 in. = 473.48 miles), 2 colors.

Accompany "Journeys in the Himalayas and Some Factors of Himalayan Erosion" by A. Neve, *Geogr. Journ.*, Vol. 38, pp. 345-362, 1911.

[Valuable original material on the Karakoram and the Himalayas on both sides of the upper Indus.]

PHILIPPINE ISLANDS. Sketch Map of the Taal Volcano Region. [1:103,000 approx. (1 in. = 3.1 miles approx.)]. [74° N. and 121° E.]. Accompanies, as Pl. I facing p. 6, "The Eruption of Taal Volcano, January 30, 1911" (in English and Spanish) by M. S. Maso, Weather Bureau, Manila, 1911.

TURKEY IN ASIA. Map Showing Miss Gertrude Bell's Route from Aleppo to Konia. [1 in. = 34 miles (1:2,154,240)]. 39° - 32° 15' N.; 32° - 45° 12' E. 2 colors. Accompanies "Amurath to Amurath" by Gertrude L. Bell, New York, 1911.

AUSTRALIA AND OCEANIA

DUTCH NEW GUINEA. Schetskaart van het Sentani-Meer, Noord Nieuw-Guinea, door Kapn. F. J. P. Sachse, Febr. 1911. Aangevuld met de opneming van de Koime-rivier door luit. der inf. J. E. Scheffer, 1:100,000 (1 in. = 1.58 miles). With inset map of Koimé River, 1:100,000, forming S. E. continuation of main map. Coordinates including both maps: [2° 32' - 2° 50' S.; 140° 33' - 140° 45' E.]. Accompanies, as Kaart XII, notes on "De Exploratie van Ned. Nieuw-Guinea," *Tijds. kon. Ned. Aard. Genoot.*, Vol. 38, pp. 823-833, 1911.

[Detailed survey of a lake near the coast of Dutch New Guinea at Humboldt Bay and of a tributary river course for 35 miles upstream, opening up hitherto unexplored territory.]

NEW SOUTH WALES. Geological Map of the Forbes-Parkes Gold Field, Geologically Surveyed by E. C. Andrews, assisted by C. E. Murton, [1 in. = 8 chains (1:63,360)]. [33° 0' - 33° 30' S.; 147° 40' - 148° 15' E.]. 12 colors. With two geological sections. Accompanies "The Forbes-Parkes Gold Field" by E. C. Andrews. *Mineral Resources* No. 13, Geol. Surv. N.S.W., 1910.

NEW SOUTH WALES. Plan Showing Allan Cunningham's Route and Site of First Recorded Discovery of Gold in Australia. [1:400,000 (1 in. = 6.3 miles approx.)]. [34° 40' - 34° 20' S.; 149° 30' - 150° 20' E.]. Accompanies, on p. 125, "Botanical, Topographical and Geological Notes on Some Routes of Allan Cunningham" by J. H. Maiden and R. H. Cambage, *Journ. & Proc. Roy. Soc. N.S.W.* for 1909, Vol. 43, Part II, pp. 123-128, 1909.

PAPUA. Map of the Territory of Papua. From the latest Surveys, 1909. 32 miles to an inch (1:2,027,520). 4° 12' - 12° S.; 140° 7' - 155° 6' E. 8 colors. With two insets: (1) Samarai (Dinner Island), 8 chains to an inch (1:63,360). [10° 0' S. and 150° 6' E.]. (2) Port Moresby, Eastern Side Showing Surveyed Townships, etc. One mile to an inch (1:63,360). 9° 27' 12" S. and 147° 0' E. Accompanies, in pocket, "Handbook of the Territory of Papua, compiled by the Hon. Staniforth Smith, Administrator," 2nd edition, Melbourne, 1909.

[Valuable large-scale official map. Shows, by colors, administrative divisions.]

EUROPE

AUSTRIA-HUNGARY. A Magyar Birodalom Közösségi Térképe (Staatsrechtliche Karte des Ungarischen Reiches). 1:1,000,000 (1 in. = 15.78 miles). 49° 30' - 42° N.; 14° - 26° 12' E. 3 colors. Accompanies note with same title by R. Harass, *Bull. Hungarian Geogr. Soc.*, Internat. Edit., Vol. 37, pp. 325-327, 1911.

[Shows boundary of Kingdom of Hungary according to claims which would include Dalmatia, Bosnia and Herzegovina. Map on larger scale than necessary for the purpose, it being a wall map.]

AUSTRIA-HUNGARY. Geologische Übersichtskarte der Umgebung von Hermannstadt. 1:75,000 (1 in. = 1.8 miles). [45° 52' - 45° 45' N.; 24° 0' - 24° 15' E.]. 6 colors. Accompanies, facing p. 42, "Beitrag zur Geologie der Zibinbenzen bei Hermannstadt" by O. Phleps, *Verh. u. Mitt. Siebenbürg. Ver. f. Naturw.* zu Hermannstadt, Vol. 58 (1908), pp. 47-59, 1909.

AUSTRIA-HUNGARY. (a) Isohyphenkarte der Umgebung des Szt. Anna-Sees. 1:50,000 (1 in. = 0.79 miles). [46° 0' N. and 25° 53' E.].

(b) Isobathenkarte des Szt. Anna-Sees. [1:2,000 (1 in. = 166.7 ft.).]

Accompany, as Abb. 7 on p. 103 and Fig. 9 (Taf. XII) facing p. 104, "Der Szt. Anna-See" by J. v. Gelei, *Bull. Hungarian Geogr. Soc.*, Internat. Edit., Vol. 37, pp. 96-118, 1911.

[On map (b) isobath interval 1 meter.]

AUSTRIA-HUNGARY. (a) Carte des environs de Titel. 1:300,000 (1 in. = 4.73 miles). [45° 14' N. and 20° 12' E.]

(b) Les environs du confluent du Danube et de la Tisza. Carte morphologique. 1:1,750,000 (1 in. = 27.62 miles). [46° 12' - 44° 32' N.; 18° 30' - 21° 5' E.].

Accompany, as Figs. 8 and 9 on pp. 277 and 279, "Compte-rendu du troisième Congrès d'Itinérant de la Société Hongroise de Géographie" by E. de Cholnoky, *Bull. Hungarian Geogr. Soc.*, Internat. Edit., Vol. 37, pp. 275-288, 1911.

AUSTRIA-HUNGARY. Die Geographische Verteilung der Gewitter in Ungarn. [1:15,000,000 approx. (1 in. = 78.9 miles)]. Accompanies, as Fig. 1 on p. 302, paper with same title by E. Héjas, *Bull. Hungarian Geogr. Soc.*, Internat. Edit., Vol. 37, pp. 296-309, 1911.

[Cartogram showing distribution of thunderstorms by quadrangles of 30' in lat. and 1° in long. Thirteen degrees of frequency shown.]

AUSTRIA-HUNGARY. (a) [Map of Part of the Görgény Mountains]. [No scale. 1:100,000 approx. (1 in.=1.6 miles)]. [46°45' - 46°50' N.; 24°50' - 25°20' E.].

(b) Geologische Kartenskizze der Mezöhavas Masse. 1:300,000 (1 in.=4.73 miles). [Mezöhavas in 46°41' N. and 25°14' E.].

Accompany, as Taf. XIV facing p. 118 and Abb. 2 on p. 121, "Über das Görgény-Gebirge" by A. Radványi, *Bull. Hungarian Geogr. Soc.*, Internat. Edit., Vol. 37, pp. 118-137, 1911.

[On map (a) relief in contours; interval 100 meters. Limit of cereals, of the vine and of certain trees shown.]

AUSTRIA-HUNGARY. (a) Geologische Skizze des Zempléner Klippengebirges. [1:93,000 approx. (1 in.=1.5 miles approx.)]. [48°55' N. and 21°50' E.].

(b) Topographische Kartenskizze des Zempléner Klippengebirges. [No scale. 1:100,000 approx. (1 in.=1.6 miles approx.)]. Same coordinates.

Accompany, as Abb. 3 and 6 on pp. 149 and 163, "Die Morphologie des Zempléner Klippengebirges" by G. Strömpl, *Bull. Hungarian Geogr. Soc.*, Internat. Edit., Vol. 37, pp. 144-180, 1911.

AUSTRIA-HUNGARY. (Tatra). (a) Cirque de Gasiencowice Staw levé à la règle à éclimètre et dessiné par Mathias Koncza, novembre 1907. Équidistance 10 m. 1:10,000 (1 in.=0.16 mile). 140°14' N. and 20°0' E.].

(b) Cirques de Koscielisko levé à la règle à éclimètre et dessiné par Mathias Koncza, novembre 1907. Équidistance 5 m. 1:15,000 (1 in.=0.10 ft.). [49°14' N. and 20°2' E.].

(c) Sondage du Lac Czervony Staw levé sur la glace avec un décimètre et dessiné par Mathias Koncza, novembre 1907. Équidistance 2 m. Alt. 1672 m. 1:2,000 (1 in.=16.7 ft.). [49°11' N. and 19°53' E.].

Accompany "Les Cirques de Montagne (Alpes fribourgeoises et Tatra)" by M. Koncza, in "Études de Géographie Physique sur le Canton de Fribourg," *Mém. Soc. Fribourg Scien. Nat.*, Vol. 7, pp. 149-196, 1910.

ENGLAND. Bartholomew's "Quarter Inch to Mile" Contour Road Map of the Environs of London. 1:253,400=4 miles to an inch. [51°5' - 51°46' N.; 0°23' W. - 1°27' E.]. 11 colors. John Bartholomew & Co., Edinburgh. Price, in case, paper 1/6, on cloth 2/6, on cloth, dissected, 3/-.

[This new map is reduced from the corresponding sheets of Bartholomew's well-known half-inch-to-the-mile maps of Great Britain. Relief, as on the larger scale maps, is represented by the 'layer' method of coloring. Eight tints are used on land ranging from a pleasing olive green to brown, and two tints on sea. The main roads are prominently brought out in red. The map, in content and execution is of the usual high standard of excellence of the products of the Edinburgh Geographical Institute. It is admirably suited to all touristic purposes.]

EUROPE. Map [of Europe] Showing the Positions of the Meteorological Stations the observations from which are used in the preparation of the [British] daily weather report. [1:20,000,000 (1 in.=315.65 miles)]. Accompanies, as Fig. 13, facing p. 102, *Sixth Ann. Rep. Meteorol. Committee* for the year ending 31st March, 1911 [Blue Book Cd. 5819], 1911.

[Shows areas from which wireless reports are received within 2 and within 24 hours of the time at which the observations were made. See also *Bull.*, Vol. 43, p. 80, 1911.]

GERMANY. Die räumliche Entwicklung Posens. 1:50,000 (1 in.=0.79 mile). [52°25' N. and 17° E.]. Accompanies, on p. 173, paper with similar title by O. Dalchow, *Geogr. Anzeig.*, Vol. 12, pp. 160-173, 1911.

[Suggestive map of the city of Posen indicating by what areas it has gradually been enlarged].

GERMANY. Die verkehrsgeographische Bedeutung der deutschen Reichsgrenze. [1:5,000,000 (1 in.=78.01 miles)]. 50½° - 44½° N.; 0° - 24° E. 2 colors. Accompanies, as Sonderbil. 59, paper with similar title by E. Schmidt, *Geogr. Anzeig.*, Vol. 12, pp. 150-151 and 175-178, 1911.

[Shows main railroad lines and points where other lines of communication cross the boundary.]

GERMANY. [Map showing the glacial geology of the region between the Elbe and Lübeck]. 1:400,000 (1 in.=6.31 miles). [53°55' - 53°30' N.; 10°20' - 11°0' E.]. Accompanies, on p. 180, "Die Entstehung des Traveeltas," by C. Gagel, *Jahrb. kgl. Preussischen Geol. Landesanstalt* für 1910, Vol. 31, Part II, pp. 168-192, 1910.

GERMANY. Verbreitung der Salzfazies in Anhalt, Provinz-Sachsen und Mark Brandenburg. 1:750,000 (1 in.=11.84 miles). 52°45' - 51°25' N.; 11° - 14° E. 1 color. Accompanies, as Taf. I, "Salzfazies und Tektonik in Anhalt, Sachsen und Brandenburg" by O. v. Linstow, *Jahrb. kgl. Preussischen Geol. Landesanstalt* für 1910, Vol. 31, Part II, pp. 23-37, 1910.

GERMANY. Geologische Karte des Dammersfeldes in der Rhön und seiner südwestlichen Umgebung bearbeitet von O. Drebe. 1:50,000 (1 in.=0.79 mile). [50°24' N. and 9°50' E.]. 20 colors. Accompanies, as Tafel II, "Geologische Beschreibung des Dammersfeldes, etc." by O. Drebe, *Jahrb. kgl. Preussischen Geol. Landesanstalt* für 1910, Vol. 31, Part II, pp. 297-342, 1910.

GERMANY. Geologische Übersichtskarte der Warburger Störungszone. 1:40,000 (1 in.=0.63 mile). 51°30' - 51°26' N.; 9°7' - 9°55' E. 20 colors. Accompanies, as Taf. 12, "Der Warburger Sattel, etc." by A. Kraiss, *Jahrb. kgl. Preussischen Geol. Landesanstalt* für 1910, Vol. 31, Part II, pp. 377-410, 1910.

GREAT BRITAIN AND IRELAND. (a) Map Showing Positions of the Climatological Stations. (b) Map Showing the Positions of the Stations having Self-Recording Instruments. Both maps 1:5,000,000 (1 in.=78.01 miles). 61° - 49° N.; 10° W. - 4° E. Accompany, as Figs. 11 and 12 between pp. 80 and 81, *Sixth Ann. Rep. Meteorol. Committee* for the year ending 31st March, 1911 [Blue Book Cd. 5819], London, 1911.

[For comment see *Bull.*, Vol. 43, p. 80, 1911.]

GREAT BRITAIN AND IRELAND. (a) [Thirteen maps of Great Britain and Ireland accompanying "The Building of the British Isles" by A. J. Jukes-Browne, 3rd edit., London, 1911, showing the distribution of land and sea through geologic history. All maps except where noted differently below: 1:9,000,000 approx. (1 in.=142.0 miles approx.).] 60° - 48° N.; 10° W. - 2½° E. 1 color. : 1. Geography of (1) Ordovician Time (Arenig). Fig. 10, facing p. 78. (2) Silurian Time (Llan-dover). Fig. 13, facing p. 96. (3) Lower Devonian Time. Fig. 10, facing p. 128. (4) Lower Carboniferous Time. Fig. 23, facing p. 98. (5) Permian Time. Fig. 31, facing p. 146. (6) The Bunter Epoch. Fig. 34, facing p. 230. (7) The Keuper Epoch. Fig. 37, facing p. 248. (8) Great Oolite Time. Fig. 44, facing p. 274. (9) Portlandian Time. [60° - 48° N.; 9½° W. - 4° E.]. Fig. 46,

facing p. 288. (10) Selbornian Time. [60° - 48° N.; 9° W. - 5° E.]. Fig. 51, facing p. 324. (11) Late Senonian Time. Fig. 53, facing p. 333. (12) London Clay and of Lutetian Times. Fig. 57, facing p. 350. (13) Upper Pliocene Time. Fig. 72, facing p. 422.

(b) [Two maps of lands bordering the English Channel accompanying same work, viz.:] (1) Geography of the Oligocene Period. [x13,600,000 approx. (1 in.=56.8 miles approx.)]. [51°40' - 48° N.; 2°40' W. - 5°20' E.]. 1 color. Fig. 58, facing p. 358. (2) Geography of Lower Pliocene Time. [x15,500,000 approx. (1 in.=86.8 miles approx.)]. [53°20' - 48°0' N.; 6°40' W. - 9°5' E.]. 1 color.

GREAT BRITAIN AND IRELAND. [Map of Census Returns 1911. Great Britain and Ireland]. x8,000,000, or 1 in.=126.26 miles. Accompanied, on p. 38, "Some Recent Census Returns" (first part) by O. J. R. Howarth, *Geogr. Journ.*, Vol. 38, pp. 306-404, 1911.

[Shows increase or decrease of population by counties or groups of counties for the decades 1891-1901 and 1901-1911.]

MONTENEGRO. Monténégro. [x1,400,000 approx. (1 in.=22.1 miles approx.)]. 43°40' - 41°40' N.; 18°20' - 20°10' E. Accompanied, on p. 41, "Le Royaume de Monténégro," by M. C. Verloop, Paris, 1911.

[Shows chief roads and telegraph stations.]

NETHERLANDS-GERMANY. Overzichtskaart van de tot heden bekende Veenbruggen in Nederland en N. W. Duitsland. x12,000,000 (1 in.=31.50 miles). [54° - 51°2' N.; 51°3' - 9° E.]. Accompanied, as Fig. 1, on p. 809, "Veenbruggen en de Nieuw Ontdekte Buinerbrug" by J. A. Mulder, *Tijds. Kon. Nederl. Aardr. Genoot.*, Vol. 28, pp. 801-820, 1911.

[Refers to 'bridges' across the fens of Frisia resembling corduroy roads. Their origin is undetermined.]

SWITZERLAND. (a) Cirque de Oberhaus (Kaiseregg) levé à la règle à éclimètre et dessiné par Mathias Koncza. Juillet 1907. Équidistance 5 m. x15,000 (1 in.=416.7 ft.). [46°40' N. and 7°20' E.].

(b) Cirque de la Chambre aux Chamois levé à la règle à éclimètre et dessiné par Mathias Koncza. Juillet 1907. Équidistance 5 m. x15,000. [49°40' N. and 9°15' E.].

(c) Cirque de Breguetz-Kessel levé à la règle à éclimètre et dessiné par Mathias Koncza. Juillet 1907. Équidistance 5 m. x15,000. [49°4' N. and 7°26' E.].

Accompany "Les Cirques de Montagne (Alpes fribourgeoises et Tatra)," by M. Koncza in "Études de Géographie Physique sur le Canton de Fribourg," *Mém. Soc. fribourg. Scien. Nat.*, Vol. 7, pp. 149-196, 1910.

SWITZERLAND. Trois "boucles" de la Sarine. Levé à la règle à éclimètre par Cesare Calciati. Juillet 1907. x10,000,000 (1 in.=0.10 mile). [50°46' N. and 7°5' E.]. Superimposed on tracing paper: Un des anciens Cours hypothétiques de la Sarine approximativement représenté. Accompanied "Les Méandres de la Sarine" by C. Calciati in "Études de Géographie Physique sur le Canton de Fribourg," *Mém. Soc. fribourg. Scien. Nat.*, Vol. 7, pp. 85-146, 1910.

SWITZERLAND. Têtes de ravins du Rio del Petit Rème et du Lavapesson. x10,000 (1 in.=0.19 mile). [46°47' N. and 7°28' E.]. Accompanied, on pp. xxiv and xxv, "Ravins et Têtes de Ravins" by L. J. Romain in "Études de Géographie Physique sur le Canton de Fribourg," *Mém. Soc. fribourg. Scien. Nat.*, Vol. 7, pp. xv-xxv, 1910.

SWITZERLAND. [Five maps accompanying "Les 'Coudes de Capture' du pays fribourgeois" by G. Michel, in "Études de Géographie Physique sur le Canton de Fribourg," *Mém. Soc. fribourg. Scien. Nat.*, Vol. 7, pp. 1-84, 1910.]

(a) Carte hypsométrique de la région de l'ancien prolongement nord-est de la chaîne de collines de la Faye. x100,000 (1 in.=1.58 miles). [46°53' - 46°48' N.; 7°9' - 7°17' E.]. Fig. 4 on p. 18.

(b) État ancien de la Vallée du Tiguelet-Lavapesson. [No scale. x175,000 approx. (1 in.=1.2 miles approx.)]. [46°50' N. and 7°6' E.]. Fig. 8 on p. 25.

(c) Topographie glaciaire du bassin supérieur de la Crausa. x15,000 (1 in.=0.24 mile). Fig. 10 on p. 30.

(d) Ancien cours de la Taferna. x100,000. [46°51' - 46°45' N.; 7°9' - 7°18' E.]. Fig. 16 on p. 49.

(e) Rapport ancien des bassins de la Sarine et de l'Aar. [No scale. x160,000 approx. (1 in.=9.5 miles approx.)]. [46°43' - 47°25' N.; 7°5' - 7°40' E.]. Fig. 21 on p. 63.

WORLD AND LARGER PARTS THEREOF.

NORTH AMERICA AND EUROPE. Map showing Glaciated Areas in North America and Europe. x100,000,000 approx. (1 in.=178 miles approx.). [90° - 20° N.; 135° W. - 70° E.]. Accompanied, as Fig. 12, facing p. 445. "The Ice Age in North America," (5th Edition) by G. F. Wright, Oberlin, O., 1911.

PART OF NORTHERN HEMISPHERE. Map of Portion of Land Hemisphere Showing Palaeozoic land connections and paths of marine faunal migrations. x1:160,000,000 approx. (1 in.=252 miles approx.). Accompanied, as Fig. 19 on p. 484, "Revision of the Palaeozoic Systems" by E. O. Ulrich, *Bull. Geol. Soc. Amer.*, Vol. 22, pp. 281-680, 1911.

WORLD. (a) [Map of the World showing present distribution of the genera *Acmea*, *Melanica*, *Mycalesis* and of the family *Varanidae* in relation to the extent of the Late Palaeozoic or Early Mesozoic Continent]. Mollweide's projection [x103,000,000 approx. (1 in.=304.6 miles approx.)].

(b) Map of the World showing present distribution of the *Terias*, *Catopsilis* and *Ampullaria* and of the *Testacellidae* in relation to the extent of the Equatorial Mesozoic Continent (after Schuchert, Lapparent and Lull). Same projection and scale.

Accompany, on pp. 413 and 417, "Zoogeography" (review of Bartholomew's *Atlas of Zoogeography*) by H. O. F., *Geogr. Journ.*, Vol. 38, pp. 413-419, 1911.

WORLD. Vie di Comunicazione Mondiali. [Mercator projection: equatorial scale 1:192,000,000 approx.]. 13 colors. With two insets on Mercator projection, x160,000,000 approx., showing distribution of races and of religions. Accompanied, facing p. 101, "Le Grandi Comunicazioni di Terra e di Mare" by L. Giannitrapani, Bologna, 1911.

[Shows clearly principal steamship routes with time of passage and the chief railroad lines.]

WORLD. The World's Telegraphic System, 1911. [Mercator projection: equatorial scale 1:190,000,000 approx.]. No map net. 1 color. Accompanied, facing p. 541, "Imperial Telegraphs" by C. Bright, *United Empire*, Vol. 2 (New Series), pp. 541-552, 1911.

[Distinguishes between non-British and all-British submarine cables. Shows proposed British cables].

OCEANOGRAPHICAL

NORTH ATLANTIC OCEAN. (a) *Carte Montrant la Distribution de la Température à la Profondeur de 1,000 Mètres et à celle de 50 Mètres à l'Époque du Frai des Principales Gadides* (Printemps). Dressée par M. I. N. Nielsen. [1:20,000,000 approx. (1 in.=355.7 miles approx.)]. 69°-43° N.; 35° W.-3° E.

(b) *Gadus Pontassou*. *Carte Montrant la Différence d'Extension entre la Zone où Fraie une Espèce et son Aire de Distribution.* [1:36,600,000 approx. (1 in.=580.2 miles approx.)]. 73°-47° N.; 33° W.-30° E.

Accompany, as Figs. 16 and 17 on pp. 184 and 185, note on "Distribution des lieux de ponte des Gadides dans l'Atlantique nord" by L. Laloy, *La Géogr.*, Vol. 24, pp. 183-186, 1911, based on paper on same subject by J. Schmidt in *Rapp. et proc. verb. du Conseil Internat. pour l'explor. de la mer*, Vol. 10, 1909, from which the maps are taken.

CARTOGRAPHICAL

FRANCE. Un dessin-modèle du rocher en haute montagne: le Cirque du Creux Noir (Vanoise). Extrait du 25^e Cahier du Service Géographique de l'Armée (France): Les Erreurs de la Carte de France par le Général H. Berthaut, planche XIX. 1:10,000 (1 in.=0.16 mile). 45°24' N. and 6°45' E. Accompanied, as Fig. 1 on p. ix, "La Méthode de l'Échantillonage Topographique au Service de la Morphologie" by J. Brunhes, introduction to "Études de Géographie Physique sur le Canton de Fribourg", *Mém. Soc. fribourgeoise de Scienc. Nat.*, Vol. 7, pp. iii-xiii, 1910.

[Exemplary in its treatment of bare rock on high mountain summits. Recommended by Prof. Brunhes to his students as a model topographic basis for detailed physiographic type studies.]

ITALY. [Three sections of the Map of Italy, 1:100,000 (1 in.=1.58 miles), showing different editions, together with plates of conventional signs:] (1) *Tipo dell' Edizione* in Nero con l'Orografia a Curve e Tratteggio. (2) *Tipo dell' Edizione Policroma con l'Orografia a Curve e Sfumo.* 5 colors. (3) *Tipo della Nuova Carta.* 6 colors. (4) *Segni Convenzionali della Nuova Carta.* 2 colors. Accompany, as Tav. I, II, IV and III, "La Nuova Carta d'Italia al 100,000 del nostro Istituto Geografico Militare" by Capt. L. Giannitrapani, *Boll. Soc. Geogr. Italiana*, Vol. 12, pp. 1190-1203, 1911. [The principal innovation on the new map is that the system of roads is brought out prominently in red. Distinction is made between four classes of roads. Relief is represented by brown contours, rendered plastic by hill-shading. Drainage in blue, woods in green areal coloring.]

TURKEY IN ASIA. Studie zu Dr. Viktor Pietschmanns photographisch-grammatischen Aufnahmen in Mesopotamien vom techn. Oberofizial Ignaz Tscharner. Wien, Juni 1911. 1:10,000 (1 in.=0.16 mile). Accompanied, as Taf. XVI, paper with same title by same author, *Mitt. k. k. geogr. Gesell. in Wien*, Vol. 54, pp. 409-431, 1911.

[Map deduced from three photographic views. Dr. Pietschmann's results admirably demonstrate the feasibility and value of photo-topographic methods in exploratory surveys.]

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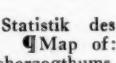
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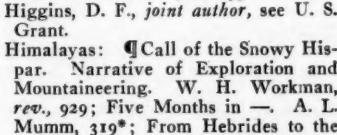
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